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DISINFECTANTS:

THEIR USE AND APPLICATION IN THE PREVENTION OF COMMUNICABLE DISEASES

Revision by

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PREPARED BY DIRECTION OF THE SURGEON GENERAL

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DISINFECTANTS: THEIR USE AND APPLICATION IN THE PREVENTION OF COMMUNICABLE DISEASES.[1]

(From the Hygienic Laboratory.)

Revised by Surgs. G. W. McCoy and A. M. Stimson, and Passed Asst. Surg. H. E. Hasseltine.[2]

INTRODUCTION.

As generally understood, disinfection is the process of destroying, or rendering harmless, disease-producing germs. In a broader sense the term may also be applied to the methods used in the prevention of disease by the extermination of disease-carrying animals (insects, rodents, etc.).

In this connection there are several kindred terms which should be defined:

Sterilization is the process of rendering living matter incapable of reproduction; bacteriologically, this means the destruction of all organisms.

Pasteurization is a partial disinfection by heat. It is practically limited in its application to food products, especially milk and cream.

Fumigation is sometimes used synonymously with disinfection, but the terms must be differentiated. The verb "fumigate" means literally "to produce smoke, gas, or vapor." While certain fumigations, properly done, may be disinfections, others have no disinfecting action. Conversely, disinfection can be done without any fumigation. In this bulletin the word fumigation means the production of gas, smoke, or vapor for the purpose of limiting the spread of communicable disease, either directly by destruction of its specific organism, or indirectly by destruction of the host or carrier thereof.

The infective organisms of the communicable diseases are, with few exceptions, much more easily killed by disinfectants than are some of the common spore-bearing and highly resisting saprophytic bacteria usually and well-nigh universally present, but as nothing would be gained by carrying the operation to the extent of killing the latter class of nonpathogenic organisms, the process of disinfection is usually one of degree only; in other words, it is not necessarily carried to the point of complete sterilization.

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[1] This bulletin was prepared originally by the late Passed Assistant Surgeon Thomas W. McClintic. In revising it an effort has been made to bring the information up to present-day usage. Certain sections have been allowed to stand substantially as written by Dr. McClintic. Revised manuscript submitted for publication Mar. 10, 1917.

[2] The officers who have revised this bulletin wish to express their indebtedness to Surg. Norman Roberts for valuable suggestions and assistance.

The question naturally arises, then, as to the best methods of accomplishing disinfection. The ideal disinfectant will in all probability never be found; consequently there will always be encountered more or less antagonism against disinfection, for, as Rosenau [1] states, "the stress of modern activities demands disinfection processes that are instantaneous in their action, all pervading in their effect, cheap, harmless, and free from any unpleasant odors that might offend the senses of the fastidious. Such perfect disinfectants are unknown. It requires time, money, and the expenditure of well-directed and intelligent energy to accomplish satisfactory disinfection."

With the advance in medical science disinfection as intelligently applied to-day is far more specific than it formerly was and the "shotgun" methods of former years have gradually passed into disfavor.

It is the purpose of this bulletin to give in a simple and concise manner the best methods of using disinfectants, and the special application of these methods in the eradication and prevention of some of the infectious diseases, with the hope that it may be of service, particularly to those who are more or less unfamiliar with the methods and technique of disinfection. The methods of disinfection, particularly the simpler, will first be described and then their special uses and applications will be given. No attempt will be made to discuss disinfectants or antiseptics from a surgical standpoint.

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[1] Rosenau, M. J. "Disinfection and Disinfectants," 1902, p. 32.

PART 1. DISINFECTANTS.

The classification of disinfectants is shown in the following diagrammatic outline.

- Disinfectants..
  - Physical..
    - Heat..
      - Incineration.
      - Dry heat.... Superheated at 100°.
      - Moist heat..
        - Steam.
        - Boiling.
        - Temperature below boiling (pasteurization).
    - Sunlight.
    - Diffused light.
    - Air.
  - Chemical..
    - Solid agents.........
      - Lime.
      - Chlorinated lime.
    - Liquid agents or solutions.
      - Corrosive sublimate (mercuric-chloride).
      - Formaldehyde solution.
      - Phenol.
      - Crude carbolic acid.
      - Pine oil disinfectant (Hyg. Lab.).
      - Cresol.
      - Potassium permanganate.
      - Lime.
      - Chlorinated lime.
      - Hypochlorite.
      - Chlorine.
      - Petroleum.
      - Gasoline.
      - Carbon disulphide.
    - Gaseous agents.....
      - Formaldehyde.
      - Sulphur dioxide.
      - Chlorine.
      - Hydrocyanic acid.
      - Pyrethrum fumes.
      - Carbon monoxide.

CHOICE OF A DISINFECTANT.

In the selection of a disinfectant the following factors should be considered: (1) Availability; (2) efficiency; (3) ease of application; (4) danger to man; (5) deleterious effect on materials; (6) length of exposure required; (7) cost.

(1) *Availability.*[1]—This will vary according to locality, time, economic conditions, and the purpose for which the disinfectant is to be used. Furthermore, in an isolated rural community the stock of the country drug store may be so meager as to compel the use of materials which would otherwise not be chosen. The time necessary to procure the desired disinfectant should also be considered. In

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[1] At present the war has placed some disinfectants out of our reach, notably phenol and potassium permanganate.

cases where heat is applicable, this agent can almost always be procured under any condition, hence it heads the list of all disinfecting agents, both as to availability and efficiency.

(2) *Efficiency.*—This has reference to the killing power under the conditions existing in any given case. It is dependent upon the penetrating power of the disinfectant, likewise upon the temperature and, in the case of gaseous disinfectants, upon the degree of humidity. The efficiency of a disinfectant will also be affected by other conditions under which it may be used. For instance, the efficiency of any gaseous disinfectant in a log cabin or other loosely constructed building practically will be nil; while in a tiled operating room with tightly sealed windows it may be very high.

(3) *Ease of application.*—This needs no elaboration. It is readily determined which processes are the easiest to carry out, but the facility with which any given process of disinfection may be applied in a particular case should not cause it to be chosen if it will not be effective, or if the danger to man or to property or the cost will be excessive. For instance, it is easier and far more efficient to burn an infected mattress than to disinfect it by any process.

(4) *Danger to man.*—In general, it may be said that any agent that is capable of killing microorganisms may, under certain conditions, exert some deleterious influence on man. No disinfectant is foolproof. While a majority of the coal-tar preparations are harmless, if used properly, one can readily understand that they may be dangerous if they find their way into the hands of irresponsible persons. The most dangerous disinfectant is hydrocyanic-acid gas; probably the least dangerous of chemical agents is chlorinated lime, as employed for the disinfection of drinking water.

(5) *Deleterious effect on things disinfected.*—In house disinfection, especially with gaseous agents, where utensils, furniture, clothing, and other textiles are exposed to the action of the disinfectant, considerable, even irreparable, damage may be done, owing to certain chemical or physical reactions. Thus, corrosive sublimate (mercuric chloride) corrodes metals, sulphurous acid bleaches textiles and wall papers, heat shrinks leather; some disinfectants may leave stains, others an undesirable odor.

(6) *Length of exposure required.*—This may be an important and determining factor in certain cases where time is limited.

(7) *Cost.*—This is to be considered from two standpoints: (*a*) Cost of the disinfecting agent, and (*b*) cost of things destroyed, or reduction in the value of things disinfected.

In the following table the advantages and disadvantages of the most commonly used disinfectants are shown in condensed form:

Advantages and disadvantages of commonly used disinfectants.

Disinfectant.	Availability.	Efficiency.	Convenience.	Dangerousness.	Destructiveness.	Adaptability.	Cost.
Heat	Universal	Absolute	Varies with form of heat used. Burning and boiling easily accomplished. Steam under pressure requires apparatus and expert management. Relatively not time consuming.	No greater than the everyday uses of heat.	Burning absolutely destructive. Boiling injures some fabrics, fixing stains thereon, and causes "running" of colors. It injures cutting instruments. Steaming spoils leather and rubber articles and glued or varnished things.	Limited to inanimate things of classes not excluded by its destructiveness. In the form of hot air in motion it promises a wider field of usefulness.	For small-scale operations, relatively cheap. Costly for extensive uses like disinfection of a water supply.
Corrosive sublimate	Readily obtainable, subject to provisions of poison laws.	Very efficient, except in the presence of albuminous matter.	Very convenient, of small bulk, and requiring relatively short exposure.	Very poisonous if ingested, and irritating to the skin, if used externally in too great concentration or too often.	Corrodes metals. Fixes stains on fabrics.	Limited by its destructiveness and by the presence of large amounts of albuminous matter.	Less than that of most disinfectants used in solution.
Formaldehyde solution.	Readily obtainable at most drug dealers.	Excellent as germicide, good as a deodorant. Deteriorates with age.	Easily applied. Somewhat bulky. Irritating odor makes its use inconvenient.	Not very poisonous nor likely to be ingested, but very irritating to skin, conjunctiva, and other mucosæ.	Very free from injurious effects.	Limited chiefly by its irritating effects. Can not be used as a disinfectant in the sick room. May be used as a fly poison.	Rather high for extensive use.
Phenol	Readily obtainable, subject to provisions of poison laws.	Highly efficient	Easily applied, requires relatively short exposure. Odor is unpleasant.	Very poisonous. Destructive to all tissues when concentrated. Benumbs the skin even when diluted.	In the usual dilutions, not destructive of most materials.	Widely useful within the limitations of a liquid disinfectant. Chief objections are its toxicity, effect on skin, and odor.	Moderate.
Potassium permanganate.	Usually obtainable at drug dealers.	Good, in a limited field. Impaired by organic matter.	Easily applied. Not bulky. Requires long exposure unless very concentrated.	Slightly toxic if ingested in large quantities, which is unlikely to occur.	Stains fabrics	Very limited. May be used for hands, as in surgery. May be used for disinfecting drinking water containers.	More expensive than chlorinated lime.

Advantages and disadvantages of commonly used disinfectants—Continued.

Disinfectant.	Availability.	Efficiency.	Convenience.	Dangerousness.	Destructiveness.	Adaptability.	Cost.
Lime	Easily obtained in most communities.	Good. Fresh unslaked lime must be used. Air-slacked specimens are inert.	Easily applied. Somewhat bulky and unpleasant to handle. Requires long exposure.	Poisonous, if ingested in concentrated form. Has caustic effect on eyes and skin. With ordinary care offers little danger.	Quite destructive of many kinds of materials.	Useful only for things which are to be destroyed, chiefly for excreta. For this purpose hardly excelled.	Relatively very cheap.
Chlorinated lime	Easily obtainable in most communities.	Good. Deteriorates rapidly on exposure to air. Must be kept in sealed containers.	Easily applied. For disinfection of drinking water very convenient.	Similar to that of lime, but with the added irritating effects of chlorine, which is slowly given off.	Bleaches and disintegrates fabrics.	Useful for same purposes as is lime. In addition is most useful for disinfection of drinking water supplies.	Moderate. Far cheaper than other disinfectants for water disinfection.
Chlorine (liquid)	Less easily obtained than chlorinated lime.	Excellent for one purpose, i. e., disinfecting water supplies.	Less easily applied than chlorinated lime, requiring more elaborate apparatus.	The fumes of chlorine, if accidentally liberated, are dangerously poisonous.	When in solution acts like chlorinated lime solution.	Practically limited to disinfection of water.	About three times as costly, normally, as chlorinated lime.
Formaldehyde (gas)	Solution from which it is prepared, obtainable at most drug dealers.	Under proper conditions of use, a very efficient germicide. It has feeble penetrative powers and its action is therefore rather superficial. Action impaired by cold and dryness.	Varies with method used. Convenient with permanganate method when available. Otherwise requires rather bulky apparatus. Requires exposures of 4 to 12 hours.	Not directly poisonous or dangerous to life. Very irritating to eyes and respiratory muscosæ.	Has hardly any deleterious effects on materials. Offers some danger of fire unless carefully handled.	This is the most generally useful gaseous disinfectant. It does not, however, kill insects and other vermin.	Including the cost of the necessary skilled labor, its cost is rather high.
Paraformaldehyde	Rather generally available.	The same as formaldehyde if properly handled. If burned, as in candles, practically inert.	Rather easily applied. Solid form and small bulk convenient.	....do	....do	Same as above, provided it is properly used.	Comparable to formaldehyde gas.
Sulphur dioxide	Readily obtainable.	With moisture, a fairly efficient germicide. An efficient destroyer of vermin, with, however, somewhat feeble penetrative power.	Easily generated and applied by the pot method, although the apparatus is bulky. Requires exposure of 8 or more hours.	Dangerously poisonous, but the odor gives warning of its presence.	Bleaches fabrics and ornamental work and attacks metals in the presence of moisture. Some danger of fire.	Now little employed as a germicide. Very useful for destruction of disease-bearing insects and vermin. Limited chiefly by low penetrative power and destructive action.	Cost relatively low.

Hydrocyanic-acid gas.	Less easily obtained than sulphur.	The most efficient agent for destroying insects and rats. Has no bactericidal power.	Application comparable to that of sulphur dioxide. Only a short exposure is necessary (½ hour), but much time may be consumed in subsequent airing, to eliminate danger.	The most dangerous and lethal disinfectant known. Does not give sufficient warning of its presence. Can be used only by experts.	The gas itself is not destructive to materials, but spilled or spattered acid may cause damage.	Strictly limited to the destruction of insects, rats, and other vermin, and to expert application with control over human inmates of the inclosure to be fumigated.	Slightly more than that of sulphur.
Carbon monoxide (Harker gas).	Available only where the special apparatus for its production has been installed.	Efficient against rats and other red-blooded vermin. Inefficient against insects and bacteria.	Requires special apparatus and very expert attention to produce an efficient gas.	Danger from its use intermediate in degree between that of sulphur dioxide and hydrocyanic-acid gas.	Not destructive to materials.	Limited to the destruction of rats or other red-blood pests, where the apparatus has been installed and an expert operator is available.	Operating cost rather low. Installation of apparatus expensive.

PHYSICAL AGENTS.

HEAT.

Probably the use in some form of heat as a disinfecting agent is better known than any other disinfectant. It is believed, however, that its efficiency, low cost, and availability make it advisable to describe its uses in some detail.

Heat may be used in three forms: (*a*) Incineration, (*b*) dry heat, and (*c*) moist heat.

Incineration.—This needs no explanation, for all will agree that destruction by fire is the method par excellence for disposing of useless refuse and infected materials of but little intrinsic value. This method is applicable to the destruction of sputum and such fabrics as cloths, or gauze which may be soiled by nasal or oral discharges, as these can easily be incinerated in the ordinary heating furnace or stove.

Dry heat.—This form of heat, as usually applied, is of but little use for practical disinfection against infectious diseases. It is used quite extensively in laboratories for the sterilization of glass apparatus, and may be used as an emergency measure in the sterilization of surgical dressings. It can be obtained in an ordinary baking oven, or in an especially constructed sterilizer. However, for most purposes, moist heat will always be available where dry heat is to be had, and is more effective.

Recently sanitarians have experimented with dry heat in an apparatus where the hot air is kept in rapid motion. They find that by this method the penetration of dry heat is much increased and that the desired results can be obtained as easily as with moist heat. In several instances power fans have been used to drive the air; other investigators use devices for deflecting the heat from a strong blast lamp so that the blast gives the air the proper motion. At the present time the data are insufficient to warrant the substitution of dry, swiftly moving hot air for moist heat, under conditions where moist heat is applicable. It seems quite definitely proven, however, that the swiftly moving hot air is far more effective than the usual method of using hot air at rest. This method may be effectively employed in the destruction of lice on clothing. For this purpose a temperature of 80° C. for one hour appears to be sufficient.

Moist heat—Steam.—With the single exception of incineration, moist heat is our most efficient disinfecting agent. It may be used in the form of steam or heated water. Its efficiency varies with the temperature obtained, provided penetration is good. Hence the most effective form would be steam under pressure, which gives a temperature of about 120° C. when the pressure is raised to 15 pounds to the square inch. This temperature will sterilize in 20 to 30 minutes.

This method of disinfection requires the installation of apparatus, which on account of its size must usually be permanently located, and articles to be disinfected must be transported to it. Portable plants mounted on motor-driven trucks may be obtained. The plant will vary in size according to the demands to be made on it. It should be borne in mind, however, that the demands upon this equipment will, in most cases, increase so that it is economical to build on a larger scale than present requirements demand. All municipal health departments, as well as institutions housing many people, such as hospitals, prisons, and reformatories, should have such a plant. It is a necessity at a quarantine detention station. A small apparatus acting on the same principle is available for laboratories and operating rooms.

The Kinyoun-Francis apparatus is the best known in America for large disinfecting plants. A knowledge of the mechanical construction of this apparatus is necessary for its intelligent operation. Briefly, the steam disinfecting chamber consists of a jacketed closed chamber. Steam is admitted to the jacket chamber, and the apparatus is thus heated to avoid condensation when the steam is admitted to the inner chamber. The materials to be disinfected are placed in the inner chamber, which is closed. Air is then removed from the disinfecting chamber by the production of a partial vacuum (15 inches) by a steam vacuum pump. By opening the proper valve steam is then admitted from the jacket to the disinfecting chamber. All steam admitted to the disinfecting chamber must pass through the jacket chamber. The partial vacuum increases the penetrating power of the steam, as the air is partially withdrawn from all interstices and folds of the materials subjected to disinfection. When the desired pressure is reached it is maintained until a proper exposure to this temperature and pressure has been accomplished. By use of the vacuum apparatus a large part of the steam can be removed to avoid condensation and consequent wetting of the articles exposed. The heated jacket facilitates the drying of the articles. When the articles are removed, they are damp, but they soon dry upon exposure to the air

An attachment has been devised whereby formaldehyde gas is evolved from its solution by the use of heat and driven into the chamber.

A similar attachment for the production of ammonia gas, to neutralize the formaldehyde, has been added; but the use of ammonia is unsatisfactory. It often results in an excess of ammonia fumes, which are as disagreeable as the formaldehyde.

With the Kinyoun-Francis apparatus disinfection can be done by steam under pressure, by streaming steam, or by formaldehyde gas, with or without a partial vacuum, and with or without dry heat, the jacket being used to obtain dry heat in the inner chamber. A degree sufficiently high to disinfect by dry heat alone can not be attained.

In filling the chamber care must be taken not to overload, as the penetrating power of the steam is not sufficient to reach the interior of large masses of tightly packed materials. With small plants there is always a tendency to overload the chamber, hence the wisdom of selecting larger plants than may be immediately necessary.

Steam under pressure is the most reliable method of disinfecting mattresses and pillows short of incineration. For this purpose the rectangular form of the above-described apparatus is preferable to the cylindrical. Other bedding, clothing (excepting leather and rubber articles), and similar fabrics may be treated in this process. Articles which can not be subjected to a high degree of heat, such as leather and rubber, can be disinfected with formaldehyde in this disinfecting chamber.

Steam at 100° C. is a highly efficient disinfectant. A longer exposure is required than when steam under pressure is used, and if spore-bearing organisms are to be killed, repeated or prolonged exposure is necessary. Any apparatus in which the material to be disinfected can be placed over boiling water, and the steam held around it by some form of hood, can be utilized for this purpose. Ordinarily the Arnold sterilizer, which is familiar to nearly everyone, is used where disinfection on a small scale is to be practiced. This method can be used in the Kinyoun-Francis apparatus.

Under ordinary conditions, however, streaming steam is not used on a large scale, though the experience of sanitarians in the present war indicates that it has great possibilities in emergency disinfection. One of the great problems of the military sanitarians during this war has been the destruction of vermin, particularly body lice, the carriers of typhus fever. A number of authors have reported a successful disinfection of clothing, bedding, etc., by using a large inclosed space as a steam chamber and leading the live steam into this through or near the ceiling. Freight cars make good chambers for disinfecting clothing. Closed rooms, situated so that wagon-loads of materials may be driven in, disinfected, and then driven out, have been used. Locomotives, steam-power automobiles, and tractors have been used as sources of steam. Temperatures of approximately 90° C. can be obtained, except in immediate proximity to the walls; this is sufficient to kill lice and many nonspore-bearing organisms.

Disinfecting apparatus on a smaller scale may be improvised by using barrels, casks, or tubs as disinfecting chambers and leading the steam into them, or, by placing them over a kettle of boiling water; this may be done in the open air.

Moist heat; boiling.—This method of applying moist heat is the most available, and it is highly efficient. It ranks with live steam in efficiency, but probably its penetrating power is somewhat superior to that of steam at 100°, especially for short exposure. It is applicable for the disinfection of linen and cotton fabrics, and may be used for wool and silk materials; but the damage to the latter will be greater. It is especially useful in the disinfection of dishes, surgical instruments, and sick-room utensils, such as bedpans, urinals, etc.

Boiling water may be used with good effect in disinfecting floors and other infected surfaces. For this purpose it may be reinforced by chemical agents. In the absence of other disinfecting agents, boiling water may be used for the bedside disinfection of feces, urine, and sputum, by adding several volumes of boiling water to the dejecta to be disinfected and taking care that lumps and masses are broken up. If this method is employed, the dejecta should be voided in containers of ample capacity.

Moist heat at degrees lower than the boiling point.—Disinfection may be accomplished by the use of heat at temperatures below 100° C., but this method should be employed only where some deleterious effect of the higher temperatures is to be avoided. For the sterilization of cutting instruments, exposure to 80° C. for 20 minutes will give good results. The pasteurization of milk, cream, and other foods is effected by heat at temperatures below boiling.

SUNLIGHT.

The direct rays of the sun are known to be highly germicidal; they will kill most bacteria in a short time if the exposure is complete. Unfortunately, disinfection is needed in many places which can not be exposed directly to the sun's rays. Moreover, sunlight is a variable quantity, dependent upon weather conditions, time of day, season, and other factors. It is a useful adjuvant to other disinfectant processes.

DIFFUSED LIGHT.

This agent has a less pronounced germicidal effect than sunlight, but does possess some disinfectant power. A much longer time is required to kill organisms, and, on this account, the effects of drying, as well as the immediate environment of the organisms, are to be considered. Organisms exposed on glass plates are much more easily killed by light than when protected by a flake of desiccated mucus.

Spores will live for many days in diffused light. So many organisms resist the action of diffused light and of drying for a considerable period that these agencies alone can not be relied upon for thorough disinfection, unless the exposure is much longer than is usually practicable. A few organisms, such as the meningococcus, treponema pallidum (the specific organism of syphilis), and certain others, have been shown to be highly susceptible to the germicidal action of light and desiccation.

AIR.

Air, of itself, has little, if any, germicidal action. Though oxygen in the nascent state has some effect on organisms, atmospheric oxygen is practically without effect. It prevents the multiplication of anaerobic organisms, but does not kill them. However, the airing of apartments and infected materials is of value, and advantage may thus be taken of any germicidal action of sunlight or diffused light. Drying, which is favored by exposure to circulating air, is of recognized effect in hastening the death of microorganisms.

CHEMICAL AGENTS.

The members of this group of disinfectants differ in physical condition—some are used in solid form, others in liquid form (including solutions of solids and gases), and still others in gaseous form. Their adaptability to different conditions is also quite variable, a matter that will be discussed when each disinfectant is under consideration.

DISINFECTANTS USED IN THE SOLID STATE.

These are comparatively few in number. The two substances most used in this way are lime and chlorinated lime, as applied to the disinfection of excreta. Although used in solid form, their disinfectant action depends on the moisture present in the excreta, whereby a solution is formed. For this reason these substances will be considered in the liquid or solution class.

DISINFECTANTS USED IN THE LIQUID STATE.

The disinfectants thus used include those which are normally in a liquid form and other agents which are used in solution.

CORROSIVE SUBLIMATE.

Synonyms: Hydrargyri chloridum corrosivum (U. S. P.) ($HgCl_2$); corrosive mercuric chloride; mercuric chloride; bichloride of mercury; perchloride of mercury.

Properties: An extremely poisonous salt, occurring as heavy white crystals or as a white powder. It is odorless and does not deteriorate on exposure to air.

It can usually be obtained at any drug store, but in most places its sale is regulated by law. It should not be sold unless the name of the purchaser and his statement of the purpose for which it is to be used are recorded, and the container properly labeled with a printed abel stating its poisonous nature and giving the proper measures to be used in case of accidental poisoning.

Corrosive sublimate is one of the most powerful germicides that we possess. It has the disadvantage, however, of corroding metals, and forming inert compounds with albuminous matter. It is, therefore, inadvisable to use it for disinfecting sputum, excreta, or under any condition in which it comes in contact with much albuminous or organic matter.

One part of corrosive sublimate will dissolve in 13.5 parts of cold water and in 2.1 parts of boiling water. It is therefore preferable to use hot water. The corrosive sublimate should be pulverized before attempting to dissolve it; even then it dissolves with some difficulty. The solubility is increased by using sea water for the solution or by adding 2 parts per 1,000 of sodium chloride (common salt) to the water employed. The water used should be free from organic matter.

The strength of solution used in disinfecting for the infectious diseases is usually 1 part of corrosive sublimate to 1,000 parts of water. This solution is made by dissolving 1 ounce of corrosive sublimate in 1,000 ounces of water—approximately 8 gallons. The solutions are best made in an earthen or wooden vessel, a wooden tub or barrel being very suitable. The addition of a coloring matter will reduce the risk of the solution being drunk by mistake. As most of the commonly used coloring matters are rapidly precipitated by corrosive sublimate, probably the best agent is a colored metallic chloride, such as cupric chloride (green). The cupric salt has the added advantage of being germicidal.

Soiled clothing, bed linen, etc., may be disinfected by soaking an hour in a 1 to 1,000 corrosive sublimate solution, then removed, rinsed in clean water, and laundered. As corrosive sublimate is a mordant, stains will be fixed permanently in fabrics subjected to such a bath. Eating utensils should not be disinfected with bichloride owing to the danger of poisoning. Walls and wooden furniture may be washed with a solution of 1 to 1,000 and floors thoroughly mopped, allowing the disinfectant to dry on the surfaces so treated.

The hands may be bathed in a 1 to 1,000 solution of bichloride without serious injury, unless there is an individual susceptibility to the drug.

Many of the "antiseptic tablets" sold on the market contain corrosive sublimate. These tablets are generally artificially colored in order to lessen the chances of accidental poisoning with them, as corrosive sublimate dissolved in water makes a clear and colorless solution.

The term "antiseptic tablets" should be abandoned, since it has been applied indiscriminately, both to tablets containing corrosive sublimate and to those containing such harmless ingredients as are used for making nasal douches, gargles, etc. The name "corrosive sublimate tablets" would be preferable to "antiseptic tablets." Such tablets are usually very soluble in water, and the method of obtaining the desired strengths is stated on the label of the container. They are very useful when only a small quantity of corrosive sublimate solution is required. A 1 to 1,000 solution is easily prepared from them and is very useful for washing the hands after handling the sick or any possibly infected material. The hands should be cleansed with soap and water, bathed in the solution for five minutes, and rinsed in plain water.

SOLUTION OF FORMALDEHYDE. SYNONYM: LIQUOR FORMALDEHYDI, U. S. P.

The U. S. P. liquor formaldehydi is an aqueous solution containing not less than 37 per cent by weight of formaldehyde gas (CH_2O), with varying amounts of methyl alcohol to prevent polymerization.

Solution of formaldehyde contains from 30 to 40 per cent of formaldehyde gas, but in referring to strengths the percentage of the solution will be stated and not that of the gas. For instance, a 1 per cent dilution of formaldehyde solution contains 1 part of the official solution to 100 of the diluent, but it contains formaldehyde gas only in the proportion of 1 to 250, provided a solution of formaldehyde containing 40 per cent of formaldehyde gas is used.

Properties: A clear, nearly colorless liquid having a pungent odor. Its vapor is very irritating to mucous membranes and the solution is irritating to the skin. This solution is popularly known as "formalin." The official solution of formaldehyde gas is a valuable disinfectant. It has advantages over corrosive sublimate in that its action is not retarded by organic matter; it is not corrosive; articles are usually not injured by it; it is a good deodorant; and it is not highly poisonous.

Formaldehyde solution is well adapted to the disinfection of urine, feces, sputum, and other discharges of like character, for in addition to disinfecting them it also deodorizes them. For this purpose, according to Anderson,[1] a 5 per cent dilution (1 volume of solution and 19 parts of water) and one hour's exposure are required. The disinfectant should be thoroughly mixed with the infectious material. Allowance must be made for the dilution caused by mixing the formaldehyde solution with the material to be disinfected. For instance, if 1 pint of feces is to be disinfected, it should be mixed with 1 pint of a 10 per cent dilution of formaldehyde solution.

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[1] Anderson, John F.: "The antiseptic and germicidal properties of solutions of formaldehyde and their action upon toxins." Bulletin 39, Hygienic Laboratory, United States Public Health and Marine Hospital Service, Washington, 1907.

Solution of formaldehyde can not be used in the sick room, as the liberated gas is irritating; nor, for the same reason, is it well adapted to the washing of floors, walls, etc. Soiled linen and bed clothing can be disinfected by immersion for one hour in a 5 per cent dilution of solution of formaldehyde.

Disinfection with formaldehyde solution should be done out of doors, when practicable, in order to avoid the irritating effects of the gas given off.

Formaldehyde solution, diluted with 40 parts of water and a little sugar added, when left exposed, is of use as a fly poison.

PHENOL. SYNONYM: CARBOLIC ACID. C_6H_5OH.

Properties: Phenol is a colorless, crystalline substance, having a characteristic odor. The needle-shaped crystals are usually found in a large mass, sometimes having a reddish tint. If undiluted, it cauterizes and whitens the skin or mucous membranes. It is an escharotic and narcotic poison.

Phenol has been arbitrarily chosen as a standard of comparison for other disinfectants which are soluble in, or miscible with, water. By these comparisons the "phenol coefficient" is determined; this gives the factor of relative efficiency of the substance compared with phenol, under the conditions of the test.

Phenol is a very useful disinfectant. It is solid at ordinary temperature, but it can be liquefied, either by heat or by the addition of about 8 per cent of water. One ounce of phenol dissolves in 1 pint of water (16 ounces), making approximately a 6 per cent solution. It dissolves in water with some difficulty; therefore, to insure its solution, hot water should be used and the mixture well agitated.

Phenol mixes with glycerin in all proportions. These mixtures may readily be diluted with water to form aqueous solutions of phenol of almost any desired strength.

As a disinfectant phenol is commonly used in aqueous solutions of 1 to 5 per cent. In these strengths phenol is not destructive to fabrics, colors, metals, etc. Therefore, it has a wide range of usefulness in disinfection. As it does not actively coagulate albuminous matter, it is useful for the disinfection of urine, feces, sputum, etc. For this purpose a 5 per cent solution is added to an equal volume of the excretions, the mass then thoroughly mixed and allowed to stand one hour before final disposal.

Soiled linen, bedclothes, etc., are best disinfected by immersion for one hour in a 3 per cent solution, and the same strength solution should be used for mopping floors, walls etc. After handling the sick or any objects possibly infected, such as bedpans, sputum cups, etc., the hands may be disinfected by washing them for two to five minutes in a 1 per cent solution of phenol. The hands should then be washed in alcohol in order to avoid the benumbing effect of phenol. As phenol does not kill spores it should not be used in attempting to destroy the infection of tetanus, anthrax, or malignant oedema.

CRUDE CARBOLIC ACID.

As sold upon the market, this is a black tarry liquid of varying composition. It has a disagreeable odor, and after use, leaves a tarry residue which is objectionable. It is much cheaper than phenol, and when properly emulsified, is an efficient agent for the disinfection of urine, feces, sputum, etc.

It contains cresols and other compounds which have great germicidal powers, but their solubility in water is so slight that the efficiency of crude carbolic acid as a disinfectant is greatly reduced unless applied in the form of an emulsion.

By adding 5 per cent of crude carbolic acid to a 3 to 6 per cent solution of soft soap an emulsion of good disinfecting power can be obtained. Unless properly emulsified its disinfecting action is very much lessened and the use of such an agent gives a false sense of security.

HYGIENIC LABORATORY PINE OIL DISINFECTANT.

In 1915 Stevenson[1] published the formula of a disinfectant in which the active principle is pine oil, a by-product of the turpentine industry. It is clear, dark reddish brown liquid, which is oily in appearance. When added to cold water (below 30° C.) it makes a white permanent emulsion. It can be used in any dilution up to 1 to 500. It is well adapted to the disinfection of intestinal discharges, but appears to be deficient against pyogenic organisms. It does not attack fabrics or metals, and apparently has no deleterious action on the skin. Its odor is more pleasing than that of the coal-tar preparations.

CRESOL.

Cresol (U. S. P.) is a mixture of isomeric cresols (C_7H_8O) obtained from coal tar. It is a colorless or slightly yellow oily fluid, becoming red with age. It is less soluble in water than is phenol, but can be made into a permanent emulsion. It is used chiefly in the compound cresol solution (liquor cresolis compositus, U. S. P.). Its disinfecting powers are somewhat greater than those of phenol. Its uses, advantages, and disadvantages are practically the same as phenol, though it probably is not so generally available.

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[1] Stevenson, Albert F.: An efficient liquid disinfectant; a formula by which one can readily be prepared. Pub. Health Reports, Oct. 8, 1915. Reprint No. 304.

POTASSIUM PERMANGANATE. POTASSII PERMANGANAS, U. S. P. (N. W. F.) KM_nO_4.

Potassium permanganate is a crystalline salt, of dark purple color, stable in the air. It is soluble in 14 parts of water.

Potassium permanganate owes its efficiency to nascent oxygen set free when brought into contact with organic matter. While its oxygen lasts it is efficient, but the amount of available oxygen is not sufficient to oxidize large amounts of organic matter.

This is a germicide of undoubted power, but of very limited application in general practice, on account of the readiness with which it is reduced and rendered inert by organic matter. Except in surgical practice its uses are largely limited to the disinfection of water tanks, cisterns, etc. For this purpose they are emptied of water and the interior thoroughly scrubbed with a 1 per cent aqueous solution of permanganate. After standing an hour or two they are washed out with water until the water comes away perfectly clear. If scrubbing of the tanks, etc., is impracticable, they may be filled with water and then enough of a strong solution of permanganate, made with boiling water, added to produce a dark rich purple color. After standing four hours the container should be drained and clean water should be added until the water in the tanks, etc., comes away clear. The tanks are then ready for use. Stains produced by permanganate can be removed by washing in a solution of oxalic acid, lime juice, or vinegar. It should be remembered that oxalic acid is a highly poisonous agent and due precaution should be taken to avoid accidental poisoning by this agent.

LIME.—SYNONYMS: CALX (U. S. P.). CALCIUM OXIDE. QUICKLIME. C_aO.

Lime occurs in hard, white or grayish white masses, or as a white powder resulting from the comminution of these masses. It is soluble in 840 parts of water. Lime is a cheap and, when properly used, an efficient disinfectant. It is much used in the treatment of privies and for the disinfection of excreta.

It is necessary that the lime be obtained fresh and kept as nearly unslaked as possible until needed. As unslaked lime is generally found in large, stony masses, it should be sufficiently slaked by the addition of a little water to break up these masses, in order to facilitate its use for disinfection purposes. In applying it there should be present only enough moisture to slake completely. The necessary amount of moisture is present in urine, feces, sputum, etc., which should be well mixed with an equal quantity of unslaked or freshly slaked lime and allowed to stand for at least one hour before final disposal. Air-slaked lime is practically inert as a disinfectant, therefore it should not be used.

MILK OF LIME.

This is a better disinfectant than lime. It is made by mixing, in a tub or bucket, fresh lime with four times its volume of water, the resulting mixture being ready for use. This is not a solution of lime but a suspension in water, and it should be well stirred before using. It is useful for disinfecting excreta, etc., to which it should be added in equal volume and the mixture allowed to stand for two hours before final disposal. Milk of lime is most efficient when first prepared. It should therefore be freshly made and used at once.

For the disinfection of excreta the use of hot water (45° to 70° C.) in preparing milk of lime is preferable. The hot water should be added to the excreta and the lime added to this mixture. This gives the disinfectant action of lime a reinforcement by the heat added in the water and the slaking of the lime increases the heat to a still higher degree.

CHLORINATED LIME.—SYNONYMS: CALX CHLORINATA (U. S. P.). "CHLORIDE OF LIME."

Chlorinated lime is a white or grayish powder, having the odor of chlorine, which gradually decomposes on exposure to the air. It is a mixture of calcium chloride and calcium hypochlorite. Its disinfecting power lies in the chlorine which is given up quite readily. It usually contains about 33 per cent by weight of available chlorine. The term "chloride of lime" is incorrect, but has attained such widespread use as to justify its mention here. Chlorinated lime is much more efficient in solution or in the presence of considerable moisture than in the dry state.

According to Rosenau [1] it ranks with unslaked lime in power and value as a germicide, and has about the same uses in practical disinfection. It is a much better deodorant than lime.

As chlorinated lime deteriorates on exposure to the air, through the liberation of the chlorine, it should be kept in air-tight containers and preferably stored in a cool, dry place.

For disinfection purposes it may be used either as a powder or in solution. As a powder it is applied in very much the same manner, but not so liberally as when lime is used. It should be well mixed with urine, feces, sputum, etc., in sufficient quantity to form about 4 per cent of the entire mass.

By mixing 1 pound of good fresh chlorinated lime with 4 gallons of water a solution of chlorinated lime is obtained which is very useful for disinfection purposes. With this solution floors may be mopped and the hands disinfected by washing them in it for a few minutes. Excreta and sputum are disinfected by thoroughly mixing them with equal volumes of this solution and allowing to stand for one hour.

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[1] Rosenau, M. J.: "Disinfection and disinfectants," 1902, p. 167.

Chlorinated lime corrodes metals, but the injury to agate ware, such as bedpans, is only slight. It bleaches and otherwise injures fabrics. The disagreeable odor resulting from the use of chlorinated lime in the sick room may be removed by hanging about in the room towels saturated with a strong solution of baking soda.

In recent years the use of solution of chlorinated lime for the disinfection of water has become very popular on account of its simplicity, low cost, and high efficiency.

It is applicable to any volume of water. It can be used effectively at any time, but is especially valuable in times of emergency, as it can be used with crude improvised apparatus for disinfecting municipal water supplies, or a small amount may be added to a bucket of water for individual use. The amount required will vary with the character of the water to be disinfected, but it may be stated that in general seldom is a water found which requires over 1 part of available chlorine per million parts of water (25 pounds of bleaching powder to 1,000,000 gallons of water); nor is it often that a water is found that will use less than 0.1 part available chlorine per million parts of water.

Chlorinated lime is not well adapted to the disinfection of water which is intended for drinking purposes if this contains much organic matter.

It is usually dissolved in a suitable container and this concentrated solution added to the water at some part of the system before the water reaches the distributing mains.

For domestic use or for use on camping or touring trips the following procedure advocated by Lumsden[1] is convenient and effective: "Keep in a tightly stoppered vessel ready for use a solution made by adding 1 teaspoonful of good (fresh) chloride of lime to 1 quart of water. To 2 gallons of water add 1 teaspoonful of this solution and let stand at least 15 minutes before using."

Chlorinated lime is also a most useful agent for disinfection of sewage effluents after the organic matter has been reduced by sewage disposal plants.

HYPOCHLORITES.

As the active disinfecting agent found in solutions of chlorinated lime is principally calcium hypochlorite, other hypochlorites may be used in the same way as the solution of chlorinated lime.

Thus Labarraque's solution, an aqueous solution of several chlorine compounds of sodium, chiefly sodium hypochlorite and sodium chloride may be used, diluted with twice its volume of water.

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[1] Lumsden, L. L. 1915. Typhoid Fever: its causation and prevention. Public Health Bulletin No. 69, p. 14.

CHLORINE.

Owing to its poisonous and destructive properties, chlorine in gaseous state is very seldom used as a disinfectant. Moisture is necessary for its action as a disinfectant, and in the presence of moisture it is also a powerful bleaching agent for all organic pigments. Carpets, curtains, and fabrics generally are injured by its action. It is destructive to both animal and plant life. Its use in gaseous form is not recommended.

Chlorine gas, liquefied under pressure at low temperatures, is used to disinfect municipal water supplies by a method similar to that used with chlorinated lime in solution. The proportionate parts are determined directly, 0.1 to 1.0 part of liquid chlorine per 1,000,000 parts of water being used according to the conditions of the case. As the action of chlorinated lime solution is dependent on the chlorine set free, the effectiveness of both disinfecting agents is about the same, though there are claimed for each some advantages which the other lacks.

PETROLEUM. SYNONYMS: KEROSENE. COAL OIL. LAMP OIL.

Petroleum is a valuable agent for killing certain classes of vermin, but is of limited application, as it must be applied in liquid form. Its principal use as an insecticide is in the extermination of mosquitoes, for which purpose it is applied in a thin film to collections of water in which they breed. As is well known, mosquitoes usually breed in standing water, such as pools, ponds, puddles, cisterns, rain barrels, etc. Petroleum is applied at the rate of 1 ounce to 15 square feet of water surface. It should be renewed at least once a week.

Refined petroleum is also useful against roaches, bedbugs, and other forms of insect vermin. For this purpose the pure oil may be directly applied, or it may be used in the form of a spray. For the destruction of lice on the body, petroleum mixed with an equal amount of olive oil is an efficient application.

GASOLINE.

This is a very useful and efficient insecticide for bedbugs and lice. In the liquid form it can be liberally poured into the cracks and crevices of beds, floors, walls, chairs, etc., infested with these insects. Even when gasoline is poured upon a papered wall it soon evaporates without injury to the paper. The strictest precautions, however, must be taken against fire, as gasoline is highly inflammable and its vapor is highly explosive and poisonous. Therefore the presence of fire or the lighting of a match in the vicinity where gasoline is being used must be prohibited.

CARBON DISULPHIDE.

This substance has been used in the destruction of rodents which burrow in the ground, particularly ground squirrels (*Citellus beechyi*, *C. columbianus*) in the eradication of rodent plague in rural districts. It is a very volatile liquid of unpleasant odor and is highly inflammable.

It is used in the holes made by the rodents either by saturating cotton waste and stuffing this into the burrows, or by pumping its vapor into the burrows with a specially designed apparatus, the mouth of the burrow being then closed with earth. It is not necessary to explode the vapor by ignition.

This agent is one of the most effective at our disposal for the destruction of lice.

GASEOUS DISINFECTANTS.

Although in the past a great deal of the disinfecting against pathogenic bacteria has been done by using gaseous agents, this class of bactericides is becoming less popular among sanitarians of the present day.

While this is true, their use for the destruction of the animal hosts and vectors of disease has been increasing. Barring the use of formaldehyde gas, a gaseous disinfectant is seldom used at present unless it is desired to kill some form of animal life.

In determining the quantities of disinfectant substances to be used for gaseous disinfection, the cubic contents of the space to be disinfected are always estimated, and usually expressed in cubic feet.

To prevent the escape of the gas from the inclosure to be disinfected, fireplaces, ventilators, cracks of doors and windows, and other openings can be stuffed with cotton, paper, rags, etc., but they are best closed by pasting, for which purpose strips of newspaper and a paste made from flour can be used. The door of exit is to be sealed from the outside immediately after the disinfection is started. After the disinfection is over the pastings can be moistened and washed off with water.

All articles to be disinfected should be well exposed to the action of the disinfectant, by hanging up or laying open to its access, as the penetrating powers of all gaseous bactericides are more or less limited. On the other hand, certain zoöcidal agents (hydrocyanic acid gas and carbon monoxide) penetrate through several feet of almost any permeable material in one hour's exposure.

The action of gases in killing bacteria at ordinary temperatures appears to require the condensation from the atmosphere of water containing the bactericide in solution. As such condensation takes place on exposed surfaces only, gaseous disinfectants have very little penetrating powers. On the other hand, the killing of vermin is effected directly by the respiration of the poisonous gas. For this and other reasons certain gases which penetrate feebly as bactericides penetrate rapidly and deeply as vermin destroyers.

FORMALDEHYDE.—SYNONYM: FORMIC ALDEHYDE, CH_2O.

For disinfection purposes formaldehyde gas is usually produced from the aqueous solution of the gas, the official (U. S. P.) name of which is "liquor formaldehydi" or "solution of formaldehyde."

Formaldehyde solution may contain 40 per cent of formaldehyde gas by weight, but from oxidation and polymerization it often falls short of this quantity. At least 37 per cent is required by the U. S. Pharmacopeia. The gas, when used under proper conditions, is one of the most powerful germicides at our disposal for surface disinfection. In addition to its germicidal efficiency, it has a unique advantage over most other disinfectants in that it is not likely to injure the ordinary household furnishings. Furniture, carpets, wall hangings, paintings, wearing apparel, and fabrics, with the possible exception of some of the very delicate anilin colors and polished steel, are apparently not affected by long exposure to the action of this gas.

It acts quickly as a germicide, but its powers of penetration are limited, so that it is necessary to have articles freely exposed in order to insure thorough disinfection. On account of lack of penetrating power it is evident that formaldehyde gas can not be depended upon to disinfect mattresses, upholstered furniture, or similar articles requiring deep penetration; consequently, instead of being exposed to formaldehyde gas, they should be either burned, boiled, steamed (under pressure), or treated with a disinfectant solution in order to make sure of destroying all infection.

Unfortunately the bactericidal powers of formaldehyde gas, as of all other germicides, are markedly affected by weather conditions. With the temperature and humidity of an ordinary summer in the United States its efficiency as a surface disinfectant is unquestioned, but when the temperature is 65° F. or lower, or the moisture in the atmosphere is below 65 per cent of saturation, the efficiency of formaldehyde is very much reduced. If the temperature and humidity are below the points stated, polymerization of a portion of the formaldehyde takes place and its power of penetration, which is only slight under most favorable conditions, is still further diminished. These effects of low temperature and humidity may in part be overcome in room disinfection by artificial heating, by sprinkling the floors with water, and also by using an increased quantity of formaldehyde. Humidity may be raised by opening a steam radiator or by boiling a kettle of water in the room.

Formaldehyde gas is useless as an insecticide and is practically never used for that purpose. Flies and mosquitoes are killed by it only after a long exposure to the gas in concentrated form. It is nontoxic to the higher forms of animal life, including man, but produces in them an irritation of the respiratory, nasal, and ocular mucous membranes, thus causing coughing, sneezing, and "watering" of the eyes. Unless the exposure is prolonged these effects, however, are only temporary and pass off when exposure is discontinued.

There are a number of methods of evolving formaldehyde gas from its solution by the use of chemicals, among which are the following:

1. Mechanical methods.
2. The permanganate method.
3. The sodium dichromate-sulphuric acid method.
4. The aluminum sulphate-lime method.
5. The sheet-spraying method.

Mechanical methods.—Formerly formaldehyde gas was largely produced by means of generators, lamps, autoclaves, etc., methods requiring special apparatus and a certain amount of mechanical skill in operating, but those methods have been supplanted by simpler ones which can be used in any household. Of the mechanical inventions for evolving formaldehyde gas from its solutions, the closed retort without pressure gives off the greatest percentage of formaldehyde gas. (Hygienic Laboratory Bulletin 27.) The autoclave with pressure is second. The evolution of the gas is rather slow by these processes, hence a larger amount is needed. In general it may be said that in spaces where escape of gas is possible through cracks, porosity of walls, etc., a smaller amount of gas rapidly evolved will be more effective than a larger amount of gas slowly evolved.

The apparatuses designed to generate formaldehyde from methyl alcohol are not reliable. Sometimes they fail to complete the process after starting and there is no means of determining whether or not they are working properly after the room is closed.

Regardless of which method is used, everything should be in readiness before the disinfection process is started. All trunks and drawers should be opened and the contained articles hung up or otherwise exposed in the room. All cupboards, closets, and bookcases should be opened.

Fireplaces, ventilators, and cracks of doors and windows should, with the exception of the doors of exit, be closed before the disinfection process is started.

To permit diffusion of the formaldehyde gas remaining after disinfection it is usually sufficient to open the doors and windows and allow it to blow out. Ammonia was formerly used, but is now seldom employed for that purpose. Even when the formaldehyde is allowed to blow out the odor of the gas is often perceptible for several days following disinfection. This, however, causes no inconvenience.

After disinfection with formaldehyde the quarters can usually be occupied an hour or two after opening the doors and windows.

Permanganate method.—When formaldehyde solution is poured upon crystals of potassium permanganate a vigorous reaction takes place, accompanied by strong ebullition of the liquid and sufficient heat to produce a large quantity of formaldehyde gas and water vapor. The time required for the reaction to begin, or at least to become apparent, varies from a few seconds to a minute or two, depending upon the temperature. The reaction is apparently over in a few minutes and with proper proportions of substances the residue in the vessel is almost dry.

A convenient and efficient proportion to use is 2 parts by weight of formaldehyde solution to 1 part of permanganate, or in the proportion of 1 quart of the former to 1 pound of the latter. By using a greater proportion of permanganate than this, slightly more gas may be evolved from the solution; but in addition to requiring an increased expenditure of permanganate, the danger of fire is also increased, as formaldehyde gas in a comparatively dry state is inflammable. The increased oxidation resulting from the additional permanganate is therefore more liable to cause combustion of the gas than when the proportions are used as stated.

For mixing the formaldehyde solution and permanganate a large galvanized-iron pail is very suitable. Pots or earthen vessels, usually being thick, are not as suitable as thin pails, on account of absorbing much heat from the reaction. On account of the vigorous ebullition during the reaction, a 10-quart pail should be used for mixing therein 10 ounces of formaldehyde solution and 5 ounces of permanganate. Even then a few drops of the mixture may be thrown over, so that it is well to place the pail in a large tin pan or upon something to protect the carpet or floor. To prevent this sputtering over there is some advantage in using a pail with a flared top. As the process is attended with slight danger of fire, the reaction, which is quickly over, should be watched through a window or the pails placed upon a noninflammable surface.

In disinfecting an entire house all inside communicating doors, halls, etc., should be opened and at least one pail placed in each room and hall, unless the rooms are very small. Large rooms may require more than one pail unless a pail proportionately large is used.

The quantity of formaldehyde and permanganate to be used per 1,000 cubic feet of room space depends upon conditions. If the atmosphere is warm and humid 10 ounces of formaldehyde solution and 5 ounces of permanganate are sufficient, while if it is dry and cold double these quantities should be used. The pails should be placed in the room or rooms as stated and the necessary quantity of permanganate weighed and placed in them; the formaldehyde solution for each pail should then be measured into a wide-mouthed cup or vessel and placed by the pail in which it is to be used. Do not use narrow-necked bottles or the pouring will require too much time. Although the reaction of formaldehyde solution with permanganate takes place quickly, by making preparations as advised one operator can "set off" a number of pails, there being nothing to do except to pour the formaldehyde solution over the permanganate. Of course the mixing should begin in the rooms most distant from the door of exit.

The time of exposure—that is, the time the premises should be kept closed—should be at least two, preferably four, hours. At the end of this time the doors and windows are opened and the gas allowed to blow out.

Sodium dichromate-sulphuric acid method.—In 1914 a method was published[1] in which sodium dichromate and sulphuric acid are substituted for potassium permanganate on account of the scarcity of the latter. The sulphuric acid and formaldehyde solution are mixed and allowed to cool. The glycerin is added to prevent polymerization. This solution is then poured over the sodium dichromate crystals spread in a thin layer in a large container.

The proportions used are:

Sodium dichromate	ounces..	10
Formaldehyde solution	pint..	1
Sulphuric acid commercial	ounces..	1.5
Glycerin	do....	1.5

Aluminum sulphate-lime method.—In this method 2½ pounds of commercial aluminum sulphate are dissolved in 2 quarts of hot water and allowed to stand for a few hours. To 1 quart of this solution 3 quarts of formaldehyde solution are added. To evolve formaldehyde gas from this latter solution it is poured over unslaked lime in the proportion of 10 ounces of the solution to 1 pound of lime. Just before using the lime it should be broken into a coarse powder in a mortar and well shaken in a ¼-inch-mesh sieve to remove the air-slaked and inert crust covering the lumps and the hard residue. The lime should be placed in a pail or vessel and the solution poured over it.

A few minutes after pouring the formaldehyde-aluminum sulphate solution over the lime the latter begins to slake and continues to do so for 20 to 30 minutes, during which time formaldehyde, steam, etc., are given off. The percentage of formaldehyde gas liberated by this method is relatively small as compared with the permanganate method, but a small quantity of formaldehyde is efficient when used under favorable weather conditions. This method should *not* be used in cold, dry weather.

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[1] Dixon. Jour. Am. Med. Assn., 1915, vol. 63, p. 1025; 1916, vol. 64, p. 459.

About 15 ounces of formaldehyde-aluminum sulphate solution, made as described above, and 1½ pounds of lime should be used for each 1,000 cubic feet of air space.

This method of evolving formaldehyde gas has no advantages, but several disadvantages, as compared with the permanganate method, and is now seldom used. It is not as efficient as the sheet-spraying method.

Sheet-sprinkling method.—This is a very simple and inexpensive method of evolving formaldehyde gas from solution. Formaldehyde solution, sheets, and a means of spraying the solution upon the sheets are all the appliances required. The sheets should be hung over cords or lines and made to hang at an angle midway between the perpendicular and horizontal, and it is of advantage, too, to dampen them slightly with water before hanging them up, as the formaldehyde will then be quickly absorbed and lessen its tendency to run off the sheets.

The solution should be evenly distributed upon the sheets, which can be easily done with a flower-watering pot provided with a sprinkler. The sprinkling should be done rather quickly, as the gas soon begins to be given off. The process should be carried out in each room to be disinfected. Not over 10 ounces of solution should be used for every 30 square feet of sheet surface.

This method is particularly applicable where a long exposure may be allowed, as the gas is gradually given off and the percentage of formaldehyde remains comparatively high during a relatively long time. This method should not be used at temperatures below 60° F., as the formaldehyde polymerizes on the sheets and very little gas is liberated.

As this method should be used only during warm months, 10 or 12 ounces of formaldehyde solution for each 1,000 cubic feet of air space is sufficient.

The time of exposure should be from four to six hours; then the doors and windows should be opened and, if possible, the sheets should be removed. The sheets are not injured in any way by the formaldehyde solution.

PARAFORMALDEHYDE.

Paraformaldehyde can be used, particularly for disinfecting small inclosures, under the same conditions of heat and moisture as already stated with regard to the other methods.

Paraformaldehyde is one of the polymeric forms of formaldehyde. It is a white powder and readily burns with a blue flame. For disinfecting purposes it should be heated to convert the paraformaldehyde into formaldehyde gas, but *under no condition* should it be allowed to burn, as the combustion destroys practically all of the formaldehyde. A method of producing formaldehyde gas from paraformaldehyde is to place the paraformaldehyde in a metal utensil under which a lamp or alcohol flame can be placed. A special lamp or device can be obtained for the purpose, but an ordinary pint tin cup will suffice for heating therein an ounce or two of paraformaldehyde. The paraformaldehyde is placed in the cup and a flame applied underneath. The flame should not be too strong, for should the paraformaldehyde ignite no formaldehyde gas will be produced and there will be no disinfection. For each 1,000 cubic feet of air space 2 ounces of paraformaldehyde should be used. The time of exposure should be about four hours. If necessary, the flame under the utensil containing the paraformaldehyde can be left burning during the time of exposure.

A solution of paraformaldehyde can be made and used in the same manner that official formaldehyde solution is used in the permanganate method. For disinfecting 1,000 cubic feet of space 2 ounces of paraformaldehyde are dissolved in 8 ounces of boiling water. This solution is then poured over 5 ounces of potassium permanganate contained in a 2-gallon pail, the details of procedure being the same as have been described for the permanganate method.

There are many forms of candles and other preparations of paraformaldehyde made and sold upon the market for disinfection purposes, but any preparation of paraformaldehyde requiring that it be ignited and burned in order to produce formaldehyde gas is useless for disinfection purposes, as the formaldehyde is destroyed by the combustion.

In using those preparations of paraformaldehyde that are heated to produce the gas, due allowance must be made for other ingredients than paraformaldehyde contained therein, and therefore a larger quantity should be used than when using pure paraformaldehyde, as at least 2 ounces of paraformaldehyde should be used for each 1,000 cubic feet of space to be disinfected. For the reason stated the use for disinfection purposes of proprietary preparations of paraformaldehyde of unknown strengths should as far as possible be avoided.

In using this agent there is always a possibility that part of the paraformaldehyde may be sublimed in the inert form instead of being converted into active formaldehyde.

SULPHUR DIOXIDE.

Sulphur dioxide (SO_2) is a colorless gas having a pungent odor, and is extremely irritating to mucous membranes. It is obtained by burning sulphur. In the presence of moisture the gas appears as a thin white vapor.

Sulphur, either as flowers or in rolls or sticks, can usually be obtained anywhere.

At present the use of sulphur dioxide for disinfection purposes is limited to the killing of vermin, and unless otherwise indicated the subsequent description will apply to its use for such purpose.

Dry sulphur dioxide (SO_2) is practically without germicidal powers. but it is especially applicable for destroying rats, flies, fleas, and other vermin that spread disease, since it is highly fatal to animal life, It is, therefore, applicable and largely used for disinfecting holds of ships, stables, barns, granaries, freight cars, and structures of this character.

In using sulphur dioxide to destroy animal pests it should be borne in mind that the best results are obtained in inclosures which offer little, if any, protection to the vermin. If used in ships, they should be without cargo if possible. All material which offers any chance for rats, roaches, or insects to find cover should be reduced to a minimum.

The penetration of sulphur dioxide is slow and uncertain for the reason that it is adsorbed in large quantities by many articles, typically by wool.

Before starting the fumigation the inclosure to be fumigated with sulphur dioxide should be made as tight as possible, as outlined on page 25.

In the presence of moisture sulphur dioxide attacks most metals, and bleaches, or otherwise injures, fabrics, wall paper, and other colored material. Metal furnishings may be protected by giving them a thin coating of vaseline or other similar substance.

The danger to man from using sulphur dioxide is so small when compared with the other gaseous vermin destroyers, carbon monoxide and hydrocyanic acid gas, that it must still be classed as our most useful agent for the general destruction of vermin, even though its efficiency is less than that of other substances used.

The principal methods of using sulphur dioxide are:

1. The pot method.
2. Liquid sulphur dioxide.
3. Sulphur furnace.

Owing to the special apparatus required, which is applicable only to large plants such as quarantine stations, the sulphur furnace will not be dealt with in this paper.

Pot method.—This is the cheapest and simplest method of producing sulphur dioxide. The materials required are sulphur, pots, and a small quantity of alcohol.

As the combustion of sulphur is dependent upon the available oxygen of the air, the rapidity of the production of the sulphur dioxide will be governed by the area of the burning surface. It is therefore very important that broad shallow pots be used to insure rapid production.

Sufficient pots should be available so that a depth of not more than 1½ to 2 inches of sulphur will have to be placed in each pot, although necessity sometimes requires a greater depth than this.

Ordinary "Dutch ovens," or iron buckets, may be used, but the best pot for the purpose is one with a flat bottom 12 to 18 inches in diameter, and with sides about 4 inches high. The sulphur should be sloped toward the center so as to form a crater or depression.

Theoretically, the complete combustion of 1 pound of sulphur in a space of 1,000 cubic feet produces 1.2 per cent (by volume) at 20° C. of sulphur dioxide, though 1 per cent is about what is produced in actual practice. Therefore, as 5 per cent is required to kill certain vermin, it is necessary to burn 5 pounds of sulphur for 1,000 cubic feet to be disinfected. After estimating the cubic space to be disinfected the sulphur should be weighed, allowing 5 pounds for every 1,000 cubic feet of space. When using stick sulphur it should be coarsely broken up. Finely ground or sublimed sulphur does not burn as well under ordinary conditions of fumigation as the medium-sized irregular lumps.

The pots should be distributed in the rooms to be disinfected according to the size of the rooms and number of pots.

When everything is ready, the sulphur is sprinkled with alcohol and ignited. A convenient and safe method of igniting the alcohol on the sulphur is to throw a lighted match into the pot while the head is still blazing. This ignites the alcohol, which in turn ignites the sulphur. Less alcohol will be used if a ball of cotton waste the size of a goose egg is saturated with alcohol, and placed in the sulphur and ignited. This also prevents sputtering from the accumulation of alcohol under the burning sulphur. Burning can also be started by placing a shovelful of coals of fire in the sulphur.

The sulphur dioxide does not begin to come off in large quantities immediately after ignition is started, so it is practicable for one operator to start a number of pots. After igniting he should make sure that the sulphur is burning in all pots, then he should close the door of exit and seal its cracks by pasting.

When the sulphur has been burning half an hour, search should be made for sulphur fumes escaping from any openings that may have been overlooked and close them.

Leave the apartment or room closed for eight hours, and then open doors and windows and allow the remaining sulphur fumes to blow out. It is well to have the windows so they can be opened from the outside, otherwise entrance to the rooms may be impossible for an hour or more. The rooms can usually be occupied in two or three hours after opening the doors and windows.

The burning sulphur causes the pots to become very hot, and to avoid danger from fire it is necessary to place them upon objects not combustible or injured by heat. Brick, sand, stones, or suitable pieces of metal may be used for this purpose. As a protection against fire the use of a pan of water beneath the pot is safest and most convenient. If dry gas is desired, the pot should be raised so that the water does not touch its bottom; if moisture is desired, the pot is set directly in the water.

In the past sulphur dioxide has been used extensively as a germicide. In order to have any appreciable bactericidal powers it must be used in the presence of moisture. Under these conditions it is a fairly good surface disinfectant, but its powers of penetration are very limited. In the presence of moisture the sulphur dioxide (SO_2) forms sulphurous acid (H_2SO_3) which is the active germicidal agent. Unfortunately in the combustion of sulphur a certain amount of sulphur trioxid (SO_3) may be found which, with water, forms sulphuric acid (H_2SO_4). This is very injurious to household furnishings, fabrics, etc., and constitutes one of the great objections to sulphur dioxide as a germicide.

If sulphur dioxide is to be used as a germicide, because of lack of better disinfectants, the necessary moisture should be provided for by evaporating water in the space, the opening of radiators, or other device for raising the humidity. A certain amount of moisture can be obtained by placing the pots in pans of water, the heat of the combustion of the sulphur being used to vaporize the water. It is doubtful if this alone will give sufficient moisture unless the natural relative humidity is high.

Liquid sulphur dioxide.—The technique of disinfection with liquid sulphur dioxide differs from the pot method only in the manner of production; therefore, that is the only phase of the subject that will be described here, the reader being referred to the description already given for further details.

The method has the advantage of liberating a large quantity of sulphur dioxide in a short time, but it is a far more expensive method than burning sulphur by the pot method, the relative cost being about 10 to 1. The method of using liquid sulphur dioxide, however, is very simple, and it is free from danger of fire. The liquid is prepared commercially and is usually obtained in metal containers, which for use only require the cutting of the leaden pipes on the tops of the necessary number of containers and the inversion of the latter in a metal or earthen vessel, when volatilization rapidly takes place.

To obtain the 5 per cent of sulphur dioxide required for disinfection, it is necessary to use 10 pounds of liquid sulphur dioxide for every 1,000 cubic feet of air space. Therefore, the space should be estimated and the required quantity of liquid dioxide obtained. Of course, with this method the same preparations and precautions with regard to injury of certain articles should be carried out as with the pot method. If a number of adjoining rooms are to be disinfected, it is best to begin opening and inverting the cans in the most distant room and work toward the door of exit. It is necessary to have everything in readiness and to work quickly, as the gas is given off rapidly. If the container of the liquid dioxide is provided with a siphon or tube the liquid can be introduced by means of a tube through the keyhole into a suitable receptacle inside the room.

The time of exposure should be eight hours.

One disadvantage of this method as compared with the pot method is that it produces no moisture, which is necessary to obtain bactericidal action.

PYRETHRUM.

Pyrethrum is an inferior insecticide, but is sometimes useful in small-scale operations, as in ridding living rooms of mosquitoes. It kills only a portion of the insects outright, but stupefies most of the remainder so that they can be swept up and destroyed by burning or otherwise immediately after the exposure. It is not dangerous to man and requires evacuation of the premises for a comparatively short time. It is burned in the same manner as is sulphur by the pot method, using from 2 to 4 pounds per 1,000 cubic feet. If all windows in the room but one have been darkened, the dead and stupefied insects will for the most part be found collected near it. The time of exposure is usually two hours. Pyrethrum may also be used as a powder by blowing it with a bellows into the hiding places of the insects.

HYDROCYANIC ACID GAS.

This gas is very poisonous to all forms of animal life, but has no bactericidal power. Its use therefore is limited to the killing of animal pests. It kills rodents and insects rapidly and certainly, penetrating all kinds of porous obstacles within a few hours. Owing (1) to the low concentration required to kill suddenly, and (2) the faint odor even when in dangerous concentration, it must be regarded as far more hazardous than sulphur, and never to be used except by those thoroughly trained for the particular task in view. When thoroughly understood and properly applied it offers a high degree of effectiveness against all kinds of vermin.

The gas is best generated by the reaction between a hot mixture of sulphuric acid and water and cyanide of sodium (pure potassium cyanide may be substituted) in rather large (1-ounce) lumps or castings. For exceptionally tight compartments, as on shipboard, the minimum proportions are, per thousand cubic feet, 3¾ ounces of sodium cyanide, 5 fluid ounces (9 ounces by weight) of sulphuric acid, and 7½ ounces (a scant ½ pint) of water. For potassium cyanide they are, 5 ounces of cyanide, 5 fluid ounces of acid, and 15 ounces (a scant pint) of water, per 1,000 cubic feet. Loosely built structures, such as dwellings, mills, barns, etc., require much larger charges.

The generator is of wood or stoneware. Metal is corroded by the reagents and glass is broken by the heat. One gallon of generator capacity is required, to prevent frothing over, for each 3,000 cubic feet of space to be fumigated; and large unit charges, as in fumigating holds of ships, require proportionately larger containers on account of the greater accumulation of heat and more violent reaction.

The water is put in first; then, with constant stirring to prevent explosion, the acid; then, without undue delay, the cyanide. In any but summer weather the dilute acid will not act on the cyanide if allowed to cool. The cyanide having been added, the operator must at once escape or he will be overcome and killed by the gas.

After disinfection, the operator runs an even greater risk in entering the compartment before it has been opened long enough to dilute the gas below the danger point. On rare occasions also, the gas has persisted in lethal concentration after apparently sufficient ventilation.

As the gas escapes readily, closing and pasting of the inclosure should be as thorough as possible. One hour's exposure is sufficient unless a thickness of several feet of cargo, etc., are to be penetrated, in which case several hours, up to 24 or more, is called for.

The time required for safe clearing out of the poison can not be stated in hours. The gas may all leak out before the compartment is opened, or it may require special measures to get it out within any reasonable time, such as artificial ventilation with electric fans. An expert may determine when a compartment is safe, by the sense of smell and the physiologic effects (headache and conjunctival irritation). It is advised that a small test animal, such as a caged mouse or canary, or a small dog, be advanced into the compartment; the animal will be overcome by a dangerous concentration of the gas and thereby give warning.

CARBON MONOXIDE.

The use of this agent requires a special apparatus. The Harker system affords the basis for what is said here on this subject.

The Harker apparatus is a mechanical device for utilizing flue gas to extinguish fires and to destroy vermin.

It consists of a (1) cooler and washer in which the gas is carried through fine sprays of water, (2) a separator in which the water is removed from the gas, and (3) a power-driven fan blower which propels the gas through the remainder of the system and through the piping by which it is distributed. The apparatus was originally intended to be installed on vessels as part of the ship's machinery for fire-prevention purposes. If ships are equipped with the apparatus, better results for fumigation can be obtained en route than where fumigation is attempted at the end of a voyage.

It is claimed that time is saved to the vessel, that there is no damage to ship or cargo, and that the procedure is cheaper than sulphur fumigation. The evidence indicates that the Harker gas is not a germicidal agent.

The gas contains sufficient carbon monoxide (1 per cent or over) to be fatal to all mammalian life and about 10 per cent of carbon dioxide, though the proportions are variable, hence it is by no means free from danger to man and should be used only by the experienced.

The great advantage claimed for it is the ability to fill holds of vessels packed with cargo. The great disadvantage is the uncertain amount of carbon monoxide in the gas, as the combustion is often difficult to regulate so that the carbon monoxide will not be oxidized to carbon dioxide, which is the gas desired for fire-prevention purposes for which the apparatus was originally designed.

PROPRIETARY DISINFECTANTS.

There are on the market in this country a large number of proprietary disinfectants, the status of which has been very considerably changed in recent years owing to the passage by Congress of an act which requires that the statements on labels of germicides and insecticides shall not be false or misleading and that the presence of inert matter shall be indicated. The manufacturer is held responsible for statements as to the strength of preparations based on comparison with phenol (phenol coefficient). Several States have passed similar laws. These Federal and State laws have doubtless gone far toward improving the quality of disinfectants that are offered for sale.

In connection with the "phenol coefficient" of germicides, it should be clearly understood that this signifies merely the relative efficiency under the conditions of the test of disinfectants as compared with pure phenol as a destroyer of the vitality of a single organism, i. e., the typhoid bacillus when the Hygienic Laboratory coefficient is referred to and the colon bacillus when the Rideal-Walker method is employed. It gives no trustworthy information in reference to other microorganisms. Fortunately it happens that probably the largest single field of usefulness of germicides is as applied to intestinal infections.

Many of these proprietary agents have been tested at the Hygienic Laboratory; a large number have been found to be highly efficient while others have been shown to be more or less inert.

PART II. PRACTICAL DISINFECTION.

In this section will be discussed the application of the agents described in the foregoing portion for the disinfection of various classes of things which have, or may have, become infected. When properly employed in the right place and at the right time, disinfection is one of the main reliances of the sanitarian. Broadly speaking the proper employment means the use of such agents in such a manner as will kill or remove all disease germs with which human beings might later come in contact. The right place is as near as possible to where the germs originate in the body of the sick person or animal, and the right time is as soon as possible after their discharge from the body. This ideal use of disinfection is, however, seldom applicable with such thoroughness that the transmission of disease can be precluded in this manner. It is believed that the efforts of health officials could hardly be expended in a more profitable way than in promoting the general employment of so-called bedside disinfection; that is, the killing of disease germs as soon as they have come from the sick body. This means, of course, a health machinery which can secure early diagnosis and notification of communicable disease, and can then exercise a supervisory, or at least an advisory, function in the conduct of the case as regards prophylaxis. The best means yet devised for accomplishing this appears to be the employment of visiting public health nurses, who visit the homes of the sick and advise and instruct concerning the proper disposal of the excreta and the disinfection of the surroundings of the patient. If their work is thoroughly done, further measures are rendered largely superfluous. So-called terminal disinfection only deserves the name and the confidence which the term implies when it has been applied after opportunities for reinfection from the patient have been finally precluded. It is futile, for example, to disinfect the sick room of a recovered sick person if he remains a carrier and continues to occupy the room.

Believing as we do that the sick person is the most potent influence in the spread of disease, we shall first consider the practical disinfection of the materials which come from his body.

DISINFECTION OF MATERIALS COMING FROM THE BODY OF THE SICK.

These materials include the secretions, excretions, and pathological discharges from all of the mucous orifices, as well as from the skin itself or lesions of the skin. They can all be disinfected by the same means, although for convenience of application, certain methods are best adapted to particular materials. The general principles which must receive careful consideration are: Careful collection of the materials in such a way as to prevent soiling of surrounding objects and to render exposure to the disinfecting agent expeditious and complete: thorough admixture with the disinfectant solution, if such be used; sufficiently long exposure to the action of the disinfectant before final disposal; and due consideration of the reduction in the specific action of the germicide by reason of the large amounts of protein and other organic matter which this class of material contains.

COLLECTION.

This varies according to the material. Urine and feces will often be voided together into a bedpan or commode, and the most convenient handling would involve treatment in this container with a disinfectant solution. If the movements were frequent, as is often the case, either a number of containers would be necessary to allow sufficient time for action of the disinfectant in each before emptying or, what is preferable, a large container of disinfectant convenient to the sick room must receive the contents of the bedpan, which is then rinsed in the solution and allowed to dry without being wiped. Where feces are passed into a draw sheet, this is immersed with its contents in a large container, the rubber sheet protecting the bed, and the soiled skin of the patient being wiped off with the solution. Any surrounding articles accidentally soiled are similarly wiped off. When the patient becomes ambulant, he should not be allowed to deposit his dejecta in the toilet or privy without preliminary disinfection, if there is a possibility of their being conveyed to other persons. This precaution should be observed until the excreta have ceased to contain the germs of his disease, as determined by bacteriological examination where this can be applied, as in typhoid fever, paratyphoid infection, cholera, and the dysenteries.

The materials from the genital openings while not containing germs which produce epidemic diseases, may readily cause accidental infections (e. g., gonorrheal ophthalmia), and should be collected on gauze or cotton and destroyed. Sputum and nasal discharges are to be collected in sputum cups, pus basins, or on gauze or paper napkins, one of the two latter being held in front of the face during coughing or sneezing to catch the germ-bearing droplets. Discharges from the eyes may cause disease (gonorrhea, trachoma, pink eye) and should be collected on gauze or paper napkins and burned. The discharges from running ears are sometimes dangerous to others, as in scarlet fever, and should be collected on cotton, replaced sufficiently often so as not to cause plugging of the orifice.

The exanthemata and certain skin diseases may in some instances be transmitted by detached scales, moist or dried secretions or discharges, etc. While it is probable that the danger from this source has been exaggerated in the past, especially as regards measles, it is on the side of safety to disinfect these materials; and the best place and time to do this is where and when they are first formed. After they have become dislodged, dried, and blown about, their destruction is more difficult. Some bland ointment like vaseline or olive oil should be kept smeared over desquamating areas, and this washed off with soap and water once or twice daily, the wash water and cloth being disinfected. Pus and other infected discharges from skin lesions and wounds must be properly collected on dressings and gauze sponges. Finally, the hands of the attendant or patient, all wash or bath water, and towels or cloths soiled with these various materials must be disinfected.

THE AGENTS TO BE SELECTED.

Fire.—Where a coal fire is available it affords the most satisfactory means of disinfecting and finally disposing of all sorts of infected material of small bulk, and the comparatively valueless materials on or in which it has been collected, such as paper sputum cups, gauze or cotton pledgets, and paper napkins.

Boiling water.—This is a generally available agent which can be used for disinfecting a great variety of infected things. It should be used in sufficient quantities so that when added to the materials their lower temperature will not reduce the heat of the resulting mixture below the germ-killing point, and containers receiving it should be covered, both to prevent too rapid dissipation of heat and to keep disagreeable odors from spreading. Bedpans and urinals should be filled with boiling water, covered with their own cover if they have one, or a folded towel, and allowed to stand for half an hour. Glass, porcelain, and metallic bedside utensils and other articles are conveniently sterilized by boiling for 10 minutes or more in a large vessel. The same method can be used to disinfect sheets and other bed clothing and towels or other cloths too valuable to be destroyed.

Lime or milk of lime.—For many reasons it may be inconvenient to make use of burning or boiling, and the necessity of removing the infected materials from the sick chamber is a real objection from a sanitary standpoint. Hence the common use of liquid disinfectants. It has been objected to these that the odor of many of them is unpleasant and may disturb or even nauseate the patient. Lime or milk of lime is free from this objection and, properly used, is efficient. Both should be fresh, and the former unslaked. The milk of lime can be freshly prepared each morning and kept in a large covered container in the sick room to receive the dejecta, etc.

Corrosive sublimate.—This is also free from odor, but becomes inert in an excess of organic matter, and must be used in large volume. It can not be kept in metallic containers, and has a tendency to fix stains on fabrics immersed in it, so that its chief usefulness is for rinsing bedpans, etc., and disinfecting the hands of the attendant and skin of the patient.

Phenol.—This is efficient, but has an odor obnoxious to many. As a disinfectant it may be used for a great variety of purposes in the sick room.

Liquor cresolis compositus (*U. S. Pharmacopœia*).—This is a more agreeable preparation of superior disinfecting power and also greater range of usefulness, and has the advantage of being less poisonous.

Hygienic Laboratory pine oil disinfectant.—This has a more agreeable odor than many of the other disinfectants, is several times as efficient as phenol. In the present state of our knowledge the use of this preparation should be confined to bacillary infections such as typhoid fever, cholera, and bacillary dysentery.

Clinical thermometers may conveniently be kept in solutions of corrosive sublimate, phenol, Liquor cresolis compositus, and pine oil.

Formaldehyde solutions and chlorinated lime.—These are efficient, but their odor almost prohibits their use directly in the sick room.

Bath water, infected as, for example, in the tubbing of a typhoid patient, may be cheaply and efficiently disinfected with chlorinated lime.

Commercial disinfectants.—Finally there is the widest choice of commercial disinfectants on the market, some of which are extremely potent. Most of the good ones have an odor which is disagreeable, at least to some persons. The prospective purchaser should ignore preparations which do not state the phenol coefficient on the label. This figure represents the number of times the product can be diluted in order to make the resulting mixture equal phenol in efficiency according to established tests. Thus a product having a coefficient of 5 could be diluted five times (4 parts of water plus 1 part of disinfectant) before its coefficient becomes 1, or the equivalent of carbolic acid.

It should be understood that phenol coefficients are determined for a single microorganism only and under restricted conditions of dilution, temperature, and time. It by no means follows that the same coefficient would be found if an organism other than the one used for the test were employed or if any of the other conditions were varied. The phenol coefficient can not be regarded as showing absolutely comparative values, but it ordinarily gives at least some information as to the relative usefulness of disinfectants. There is urgent need for better methods of determining relative values of these agents, but until they are devised the phenol coefficient may be employed to advantage.

Summary.—To sum up this section, while there is a wide choice of agents available, the most readily secured and generally useful agents for sick-room disinfection are fire, boiling water, milk of lime, and some agent for hand and skin disinfection like liquor cresolis compositus, Hygienic Laboratory pine oil disinfectant, or one of the commercial preparations. With the intelligent and faithful use of these agents, it is believed that the maximum of bedside disinfection can be accomplished, and since this is the most important and strategic of all applications of disinfection, its proper carrying out leaves little else to be done. Of course exception has to be made of the few diseases commonly encountered which are transmitted by insect carriers, against which special measures, to be dealt with under the heading of the particular disease, must be taken.

TIME OF EXPOSURE.

The time of exposure to various disinfecting agents must receive careful attention. Exposure to fire means complete destruction, half-burnt material being dangerous since it may be thrown out where man or animals may come in contact with it. For the ordinary nonspore forming bacteria, a few minutes at boiling temperature is sufficient, but time must be allowed for cold articles immersed therein to reach this temperature. Exposure to temperatures below boiling, as when boiling water is poured into a bedpan and allowed to stand, should be for not less than a half hour. Milk of lime should be allowed to act for two hours, and for most of the other agents mentioned above the exposure should be one hour.

The mere dipping of the hands in germicidal solutions is often assumed to be sufficient. They should be immersed for several minutes, preferably as much as five, or if removed sooner should not be dried on a towel but allowed to dry by evaporation.

DISINFECTION OF CLOTHING, BEDDING, AND PERSONAL EFFECTS.

The most convenient, ultimately economical, and efficient manner of disinfecting this class of articles is by steam under pressure in a central and stationary or in a movable plant designed for the purpose and operated by an expert. Comparatively valueless and badly soaked mattresses had better be burned. In any case where removal from the sick room is necessary, the articles should be wrapped in a strong cloth, or packed into containers, preferably of metal (wash boilers or new garbage cans) for transportation. Where no steam plant is available, and for the class of articles which will not with-stand steam treatment, the other means at our disposal are gaseous disinfection, the application of a liquid disinfectant, and exposure to air and sunlight. The methods of applying the first and its limitations are fully discussed elsewhere. Suffice it to say here that unless one is prepared to do it properly, giving necessary attention to the factors of thorough sealing, the evolution of sufficient concentration of gas, the maintaining of adequate temperature and humidity, there is little reliance to be placed in the measure.

The effect of air and sunlight on infected articles of clothing must remain problematical. Comparatively few pathogenic organisms resist the combined effects of drying and sunlight when definitely exposed to them under experimental conditions, but under practical conditions the folds and thicknesses of clothing may protect the organisms to an extent which we have no means of estimating for all conditions. If no more certain means of disinfection are at hand, however, this natural means should not be neglected, and its employment should be thorough. The position of the articles as hung up should be changed several times, and they should be turned inside out if necessary, so as to allow the air and sunlight access to all parts. This should be done for several successive days.

It must be noted here that some health authorities fear the dissemination of infection by its being blown about from articles hung up out of doors in the manner described. Their opinions must be considered and their regulations complied with, but it appears to us that the transmission of disease in this manner must be a remote possibility. Carpets and rugs should not be allowed to remain in a sick room where they may be exposed to contamination unless it be to mitigate the coldness of the floor for an ambulant patient.

Steam disinfection, soaking in one of the solutions (for this purpose corrosive sublimate is well adapted), and gaseous disinfection are the measures recommended for this class of articles, in the order of effectiveness. If of little value the articles may be burned. There are many articles of personal use which can not be subjected to steaming without serious damage, such as leather articles and those containing glue or sizing. Since ordinarily their chance of conveying infection is but slight, they may usually be treated by simply wiping off with a good disinfectant solution.

DISINFECTION OF ROOMS AND BUILDINGS, ETC.

Thus far we have considered the sick person and his discharges, and such articles as are likely, through immediate contact with him or close proximity to him, to have become infected with disease germs. We must now consider the rooms or other inclosures which he may have visited or inhabited, or in which he has been confined. As has been said, if the germ-bearing discharges, etc., of the patient have been promptly and thoroughly disinfected as soon as they came from him, further procedure is rendered superfluous. It must often occur, however, that such ideal handling of the case has not been realized, and that some contamination of the floors, possibly even of the walls, with infectious material has taken place.

Much has been written on the length of time during which various disease germs can remain alive and virulent under these circumstances; but many of the questions which arise in this connection can not be answered by laboratory experiment, and we are often without exact data on which to base our action in dealing with the problems. We know of no rule better than the golden rule to apply in this connection. Let the health officer employ such measures as he would like to have employed if he were going to move into the apartment with his children. Less than this he would not be justified in doing for others. Mechanical cleanliness secured and maintained by sufficiently frequent scrubbing and dustless wiping to prevent the visible accumulation of dust and dirt during the presence of the sick person in the room is a reasonable and relatively inexpensive measure which should form a minimum requirement. The wash water and cloths should be disinfected.

As will be seen in the section on terminal fumigation, the practice prevails among sanitarians at the present time of employing disinfection of sick rooms rather on the basis of the dangerousness of the disease than on that of any accurate datà as to effectiveness. This practice can not be criticised, granted that scientific data are lacking on which to base rational procedure. The question remaining, therefore, is how to accomplish disinfection most economically and at the same time efficiently.

Of the various fumigants, formaldehyde is the only one to be considered as a germicide for general domestic disinfection, the practical limitations of the others precluding their use except in relatively rare cases. This agent, properly employed, will kill ordinary pathogenic bacteria on the surface of things, that is, in their most dangerous location. The proper employment of the agent, however, is not a simple matter and can not be intrusted to low-grade labor. The sealing of the apartment to prevent the escape of gas; the thorough exposure of the contents of the room; the certain maintaining of a proper temperature and humidity during the operation; and the evolution of a known adequate concentration of gas are details which must be intelligently and conscientiously attended to if formaldehyde fumigation is to amount to anything but a placebo, engendering a dangerous confidence. This means well-paid employees and considerable expenditure of time, and on this basis only should comparisons of the cost of formaldehyde disinfection and mechanical cleaning be arrived at. A case for the cheapness of formaldehyde disinfection could easily be made out, if one were to consider only the lighting of one or more "candles" and the shutting of the door.

Mechanical cleansing, supplemented or not by the use of liquid disinfectants and renovation, is practically the alternative to gaseous fumigation with formaldehyde. The common alkaline soaps have a demonstrable bactericidal value, and this, together with the mechanical removal in a sanitary way of the supposedly germ-laden dust and dirt by scrubbing with soap and water, is what is relied upon to free the room from infection. If it is desired to make use of liquid disinfectants, corrosive sublimate solution offers the advantages of being odorless and of undoubted efficiency. Complete interior renovation is required in only extreme instances. Where the interior is in such bad repair as to offer harborage for dust and dirt which may contain the germs of disease or where wall paper near the bed has become soiled by the patient, it would appear to be on the side of safety to plaster, repaper, paint, or calcimine according to the need.

The foregoing applies especially to sick rooms. There remain a variety of other inclosures which may demand different treatment. It is believed that gaseous disinfection is seldom necessary in school rooms, mechanical cleansing with especial attention to the particular portion and the effects used by the patient being deemed all that is necessary or of practical value.

The same applies in general to factories and warehouses. In this latter class, however, it is more frequently necessary to take steps for the eradication of vermin which may be the carriers of the disease in question. Here one of the objections to the use of sulphur fumes in residences does not as a rule apply, namely, its destructive effect on ornamental fixtures. This agent is at present the most generally useful one known, but there are conditions where hydrocyanic acid gas can be most conveniently and efficiently used, and factories and warehouses will offer these conditions most often, since as a rule their conditions of habitation are such as to minimize the danger of poisoning from the gas. These inclosures are frequently less susceptible of hermetical sealing than dwelling rooms, and it is consequently essential that the gas be evolved rapidly and exert its killing effect quickly in order to overcome the vitiating effect of leakage. "Cyanide" gas conforms to these specifications and may well be considered by the sanitarian in charge, but never unless he is fully cognizant of the danger attending its use, has well disciplined and drilled assistants to carry it out, and has control of the building.

Stables may become infected with the germs of diseases common to man and to the lower animals, and it may sometimes be considered necessary to disinfect them, although, with the possible exception of glanders and foot-and-mouth disease, the manner of transmission to man does not suggest danger from this source. In any event, mechanical cleansing, burning of rubbish, and whitewashing will be all that is necessary or trustworthy. Where rats and fleas are to be eradicated, as in antiplague operations, sulphur or hydrocyanic acid gas fumigation will be indicated.

For the choice of disinfectants for use on ships and railroad trains the reader is referred to the regulations governing the sanitary aspects of interstate and foreign traffic, in which these common carriers for the most part engage.

DISINFECTION OF FOODS AND DRINKS.

Theoretically one should not eat or drink anything known or suspected to be infected with disease germs, but practically it may be difficult or impossible to avoid doing so. The most generally useful agent for disinfecting this class of substances is heat. Thoroughly cooked food does not transmit infectious disease. Neither does boiled water.

Since cooking of most foods is a necessary preparation for their consumption, no extra expense is involved in their disinfection, but the disinfection of large quantities of drinking water by boiling is expensive and attended with other drawbacks. At present the alternative is chlorination. Other chemical treatments, and, except in rare instances, the use of such physical agents as ultra-violet rays, can not compete with chlorination (see p. 24) for cheapness, efficiency, and ease of application. The installation of filters for the treatment of water supplies is of course a well recognized and established procedure, which, however, it is scarcely the function of this bulletin to discuss.

TERMINAL FUMIGATION.

Within comparatively recent years the use of fumigating agents as bactericides has been greatly restricted and in some places entirely abandoned. One can not proceed far in a study of this subject without becoming convinced that a very large proportion of the health officers who continue to use gaseous disinfectants would abandon them in connection with most diseases but for the feeling that the public demands that health authorities shall continue measures which it has long been believed give a large measure of security.

It should be kept in mind that terminal fumigation and terminal disinfection are not to be confused. No one would question the desirability of thorough measures looking to the disinfection of infectious material by rational methods when there are grounds for believing that it is present, but that this is to be accomplished by routine use of formaldehyde vapor or sulphur dioxide is unlikely.

The objections to gaseous terminal fumigation are twofold: First, it is claimed that it is unnecessary; that apartments do not harbor disease-breeding microorganisms; that the sick person, his excretions, and secretions, his clothing (including bedding), the hands of attendants and other articles that actually come in contact with the sick are the only sources of appreciable danger; second, it is claimed that, even assuming that an apartment is contaminated, fumigation is useless either on account of the inefficiency of the fumigant used, its improper application, or through the inability of the agent to penetrate fabrics or other articles.

One of the most telling points against terminal fumigation is the fact that so far as our present knowledge goes the period of greatest danger of infection in most diseases is during the early part of the illness, and that in all likelihood the danger after convalescence is slight. In acute infectious diseases the danger after the death of the patient would of course depend upon the time which had elapsed after onset.

There are those who assert that in continuing fumigation we are on the "safe side" and that the process should be perfected rather than abandoned.

Chapin, of the Providence Board of Health, appears to be the pioneer (1900) in advocating the discontinuance of terminal fumigation.

The Department of Health of New York City has abandoned the procedure and found no cause to regret the step. Dealing with this subject Knause[1] states that there was practically no difference in results as regards scarlet fever in Brooklyn with fumigation and the other boroughs of the city without fumigation. He insists that as regards diphtheria it is of secondary importance compared to throat and nose examination, and that as regards smallpox it is not to be compared to vaccination. His contention is that terminal fumigation is costly, unreliable, and an admission of improper measures during the attack.

Several other cities have discontinued terminal fumigation.

So far as we can judge by the published reports, in none of the communities in which fumigation has been abandoned has there been an increase in infections which has led to a restoration of the method. This we think is strong evidence that the procedure may be dispensed with and no harm result.

The following are examples of the objections raised by those who advocate doing away with terminal fumigation:

Ruhland,[2] commissioner of health, Milwaukee, says that his experience has shown that abandoning formaldehyde fumigation has not increased the number of reinfections. "Formaldehyde fumigation as it is and has been practiced is a ceremony not a service; it is a text-book tradition, an advertiser's fairy tale, a useless expenditure of money, and, worse, a menace, inasmuch as it creates a false sense of security which causes families to neglect to do what is really of value. Let us have the courage of our convictions and do away with it."

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[1] Am. Journal of Public Health, vol. 6, April, 1916, p. 364.

[2] Wisconsin Medical Journal, vol. 13, p. 477.

QUESTIONNAIRE ON TERMINAL GASEOUS DISINFECTION.

While those engaged in the revision of this bulletin are substantially in accord on the subject of terminal gaseous disinfection, it was felt that to neglect the opinions of sanitarians who are daily being called upon to decide whether or how to disinfect premises following sickness would be a grievous omission. Accordingly the following questionnaire was sent to sanitarians and health officers.

QUESTIONNAIRE ON GASEOUS TERMINAL DISINFECTION.

There is a division of opinion among sanitarians as to the utility of, and the indications for, gaseous disinfection of houses and apartments which have been occupied by persons having communicable diseases. This questionnaire is being submitted to those having special knowledge of the matter, in order to define accurately the points at issue and to secure suggestions as to the best approach to the solution of the questions involved. For convenience in answering and collating, the accompanying tabulation has been prepared, in which it is desired that + and – signs be used to signify "yes" and "no," respectively. As there are questions which you may desire to answer more fully than by "yes" or "no," you are invited to expand your answers in footnotes (with reference numbers) ad libitum. The necessarily brief question heads of the tabulation are more fully explained as follows:

1. "Transmitted by germs harbored in apartments, etc." It is desired to learn in what diseases occurring in your section of the country you believe that transmission occurs, in part at least, from exposure to germs which have been harbored in apartments previously occupied by persons sick of or having died of those diseases.

2. "Gaseous terminal disinfection competent to limit spread." In which of the diseases mentioned under No. 1 do you consider that gaseous terminal disinfection is competent to limit the spread of sickness by exposure to germs harbored in apartments? (By "apartment" is meant any occupied dwelling or working place, etc.)

3. "Gaseous disinfection economically justified." As an example of a disease where the procedure would not be economically justified, we may cite the common cold. Although probably transmitted in part by germs harbored in apartments, and susceptible of some limitation by terminal disinfection, colds are so commonly transmitted by more direct methods that the routine disinfection of apartments after each occurrence of a case therein would be a waste of money—not economically justified. This question aims to elicit your opinion as to what diseases are sufficiently limited by gaseous disinfection, to justify the expenditure of money in this way rather than in some other means of combating the disease.

4. "Methods necessarily concomitant, or superior." What other methods directed against the germ do you consider to be indispensable concomitants of terminal disinfection with gases, or superior to it in the limitation of the spread of disease? As examples of what is meant, we may suggest the use of mechanical cleansing and the bedside use of liquid disinfectants in certain diseases.

It was realized that this questionnaire was one difficult to answer by plus and minus signs, and it was gratifying rather than otherwise to receive so many replies emphatically stating this fact. If a health officer were provided with scientific information on the questions propounded he would have no difficulty in answering with plus and minus signs. It is his misfortune, and not his fault, that the various branches of science involved have not yet furnished the data on which he can base a thoroughly consistent procedure. In the following table is a summary of the 61 replies received. The figures indicate the number of persons replying in the manner indicated by the columns.

Disease.	Transmitted by germs harbored in apartments?		Gaseous terminal disinfection competent to limit spread?		Gaseous terminal disinfection economically justified?		Methods necessarily concomitant or superior?						
	Yes.	No.	Yes.	No.	Yes.	No.	Bedside disinfection.	Mechanical cleansing.	Air and sunlight.	Germicides, liquid.	Heat disinfection.	Renovating.	Unspecified.
Cerebrospinal meningitis	11	15	8	19	11	18	5	6	4	3	2	0	2
Chicken pox	12	23	10	23	4	30	6	5	2	1	0	0	1
Diphtheria	27	8	22	14	26	13	12	10	4	4	2	0	2
German measles	6	26	6	25	3	30	4	3	1	1	0	0	1
Leprosy	8	13	5	18	7	15	4	4	1	2	1	0	2
Measles	5	30	4	28	3	30	7	4	2	1	0	0	1
Mumps	4	28	4	28	2	32	4	2	1	1	0	0	1
Pneumonia	8	26	7	25	5	27	9	6	2	1	0	0	2
Poliomyelitis	16	12	13	16	19	16	6	4	3	3	1	1	2
Scarlet fever	34	10	29	13	30	11	10	10	4	4	2	0	2
Smallpox	37	7	31	11	31	11	9	9	4	5	2	0	1
Trachoma	10	18	6	22	5	23	7	4	1	0	0	0	2
Tuberculosis	40	4	26	17	27	12	12	9	4	4	1	1	2
Typhoid fever	22	17	10	25	8	28	12	9	4	2	1	1	2
Whooping cough	5	29	5	29	1	34	4	4	1	1	0	0	2
This class of communicable disease in general	......	......	......	......	......	......	11	29	15	8	7	5	0

It will be noted that a majority believed that the following diseases are transmitted, in part at least, by germs harbored in apartments following sickness therein—diptheria, poliomyelitis, scarlet fever, smallpox, tuberculosis, and typhoid fever—and that, with the exception of poliomyelitis and typhoid fever, the spread of these diseases could be limited by gaseous terminal disinfection. Now diphtheria, scarlet fever, smallpox, and tuberculosis are much feared, because of their high fatality (or the reputation for it), great prevalence, high infectivity, and difficulty of control, or one or more of these characters. The remaining diseases of the list for which terminal disinfection is not considered a useful measure are either mild (or have the reputation for mildness), comparatively rare, of low infectivity, or rather readily combated by means other than gaseous disinfection, e. g., typhoid fever by bedside disinfection.

On comparing the two groups of diseases as they are delimited by the results of the questionnaire, some prominent resemblances are to be found which do not favor the diseases being placed in separate groups so far as transmission or prevention is concerned. For example, we know of no evidence to show that the transmission or prevention by disinfection of smallpox would in any way differ from that of chicken pox. The same applies to diphtheria and whooping cough. From these contrasts and comparisons it might be deduced that the health officer has, perhaps unconsciously, been swayed in his statements regarding the transmission of disease and the application of disinfection to its limitation by consideration of the danger and importance of the disease. While this is not rational, it is, to an extent, laudable, because it evidences a tendency to afford the public what protection may possibly be obtained from gaseous disinfection, even though this be dubious and undemonstrated.

As regards the economic justification for terminal gaseous disinfection, the opinions follow closely those on the competency of this measure to limit the spread of disease, with the paradoxical exception that as regards poliomyelitis a greater number believed the measure justified than believed it competent to limit the spread. This paradox extends to the individual answer sheets, and does not arise solely in the compilation by reason of unanswered questions. As it stands, the composite opinion is virtually that we are to employ terminal gaseous disinfection only after those diseases which are at once dangerous, common, of high infectivity, and not otherwise readily controllable, but even in these cases there is a respectable minority who believe that there is no economic justification in employing the measure.

Of the 61 persons answering the questionnaire, only 6 failed to mention in connection with at least one disease some measure directed against the germ which they considered necessarily concomitant with or superior to terminal gaseous disinfection. Of these measures, the bedside disinfection or other proper disposal of the excretions, etc., of the sick person and scrubbing of the floors, walls, etc., of the sick room with soap and water, were rated as of high importance. Exposure of the bedding, etc., to air and sunlight came next in order and was followed by the procedure of using liquid disinfectants on the interior of apartments. A smaller number advocated the use of steam or other forms of heat in disinfecting bedding and other soiled articles, while only a few mentioned repapering, painting, and renovating as useful measures.

PART III.

METHODS ADVISED AGAINST CERTAIN DISEASES.

In the case of many of the communicable diseases, the specific organism is known and its modes of transmission are understood; with others the specific germ is known, but its modes of transmission are not at all or only poorly understood; with others the organism has not been identified, but its modes of transmission are at least fairly well understood; while with still others the specific organism or cause is still unknown and its ways of transmission are not understood. Furthermore, some of the communicable diseases are transmitted through the agency of insects acting as simple carriers of the infection; others through insects as intermediate hosts; and still others through food, drink, contamination of the air as by droplets, contact, and various other ways.

It is evident that the uses and application of disinfectants and insecticides in the prevention of all communicable diseases is a large subject, and to take up each disease in detail would reach far beyond the limits of this bulletin. Therefore, as some diseases call for the same general hygienic management and preventive measures, the one most typical of the class will be described and the remaining diseases of that class described only in so far as they may differ from the one described as typical. For instance, the prophylactic measures that should be carried out against typhoid fever are very much like those that should be taken against cholera, dysentery, etc., and therefore typhoid will be taken as typical of the class; likewise smallpox will be described as typical of the exanthemata, others of which are scarlet fever, measles, chicken pox, etc.

It should be borne in mind that, after all, disinfection is a more or less relative process and that it can but seldom be made absolute.

There are several diseases, for example, pneumonia and whooping cough, concerning the transmission of which we know so little that it seems unnecessary to discuss them here.

TYPHOID FEVER—CHOLERA—DYSENTERY.

TYPHOID FEVER.

The sick room should have a bare floor, so that it may be washed with a disinfectant from time to time and whenever it may be soiled with the patient's excretions; unnecessary furniture should be removed from the room; a basin containing a 1 to 100 solution of carbolic acid or a 1 to 1,000 solution of corrosive sublimate should be in readiness for the physician's and nurse's hands. A cup or glass containing a 1 to 40 solution of phenol for the thermometer should be on hand, and the thermometer should be kept entirely submerged in the solution when not in use, being rinsed with water before taking the temperature. One or more bedpans should be available, and there should be on hand a supply of disinfectants, as well as some buckets or vessels in which to prepare the disinfectant solutions.

Special gowns for those attending the patient may be used, but they are not necessary, provided intelligent care is exercised. The nurse, however, should wear a rubber apron when bathing the patient, and it should be washed frequently in 3 per cent phenol solution. Persons not needed in the sick room should be excluded.

Disinfection and disposal of excreta.—All discharges from a typhoid fever patient should be disinfected as soon as they leave the patient.

This is economically and efficiently accomplished by having a jar, bucket, or pan large enough to hold several times the volume of the excretions voided in 24 hours. It is placed convenient to, but not in, the sick room. The urine, feces, etc., are placed in it when they are voided, and a volume, equal to or greater than the volume of excretions, added to it of one of the following solutions:

Solution of chlorinated lime.
Milk of lime.
Solution of phenol, 5 per cent.
Solution of formaldehyde, 10 per cent.
Compound cresol solution, 2 per cent.
Pine-oil disinfectant, 2 per cent.

The bedpan is rinsed with the disinfectant solution and it then should be immersed for at least 10 minutes in one of the above solutions, contained in a suitable vessel. Bedpans may also be disinfected by sprinkling them with a strong solution of formaldehyde and then simply covering them with a heavy cloth for 15 to 20 minutes. On account of the formaldehyde gas given off this should be done out of doors.

In the above manner the entire excretions of a patient for a day can be disinfected and finally disposed of in sewers, water-closets, privies, etc., without danger of spreading the infection.

Chlorinated lime (powdered form), if used for disinfecting excreta, should be thoroughly mixed with the excretions in sufficient quantity to form 4 or 5 per cent of the entire mass. Likewise, lime used for the same purpose should be added in volume equal to that of the excretions.

When it is impracticable to disinfect in this manner the excretions for 24 hours, excretions from typhoid patients should not be finally disposed of until they have been exposed to the action of the disinfectant for at least one hour.

The typhoid germ is rather easily killed by heat; therefore when disinfectants are not available, or only in very small quantities, typhoid excreta can be disinfected with boiling water. In this case the excretions may be sufficiently disinfected to render them safe by filling the bedpan containing them with boiling water and allowing it to stand until cool; the contents of the pan are then disposed of. Of course the excretions may be disinfected by boiling them in a vessel located in the back yard or some other suitable place. The bedpan, after it is emptied, should be placed in boiling water.

The preventive measures outlined above should be kept in force, with regard to the urine and feces of typhoid patients, after recovery until the dejecta are bacteriologically negative for *B. typhosus.*

Disinfection of the hands.—After handling the patient, bedpan, soiled linen, or any possibly infected material, the hands should be washed for at least two minutes in one of the following solutions:

Corrosive sublimate, 1 to 1,000.
Phenol, 1 to 100.
Liquor cresolis compositus, 1 to 300.
Hygienic Laboratory pine oil disinfectant, 1 to 400.

After the hands are washed in phenol or cresol solutions they should be well rinsed. Alcohol may be used to avoid the benumbing effect of the solutions. Persons engaged in handling and managing typhoid fever patients should avoid, as far as possible, placing their hands about their own faces, and they should invariably wash their hands in one of the above disinfectant solutions before taking food or drink.

Disinfection of soiled linen, bed clothing, eating utensils, etc.—Soiled linen, towels, bedclothes, etc., are best disinfected by boiling them for a few minutes. They may also be disinfected by immersion for one hour in a 1 per cent solution of phenol or 0.5 per cent liquor cresolis compositus.

Eating and drinking utensils, after being used by the patient, should be immersed in boiling water. They should not be used by others until they have been sterilized by boiling.

Disinfection of the bath water.—The water used in bathing the patient may undoubtedly be infected by the patient's excretions. The ordinary bath of 50 gallons of water may be disinfected by mixing in it half a pound of chlorinated lime and allowing it to stand for half an hour before disposing of it.

Terminal disinfection.—If fumigation of the room after convalescence, death, or removal of the patient is deemed necessary, formaldehyde gas should be used, as described on page 26 et seq.

The floor, tables, bed, chairs, etc., should be washed with a disinfectant solution. The bed clothing, pillows, linen, etc., should be treated as already described. The disinfection of mattresses without the use of a steam chamber is a difficult and uncertain problem. Therefore it is far better that they be burned, if contaminated.

The watchword in typhoid fever prevention is to disinfect the excretions as they leave the patient, and to avoid taking living typhoid germs into the body in the food, drink, or otherwise, for unless these germs be taken into the body through the mouth there will be no typhoid fever.

In typhoid fever we must always have in mind the possibility of transmission of the disease by flies. While entirely satisfactory evidence that this mode of conveyance is common is wanting, nevertheless we are not justified in permitting infectious discharges to be deposited where flies may have access to them.

The fly, therefore, should be rigidly excluded from the sick room and from the whole house, if possible, by screening; fly paper or fly poison should be exposed in the sick room to kill any that may by chance gain entrance thereto.

CHOLERA.

The feces, always, and the vomit, frequently, of those having cholera contain the germs in great numbers, but they are not found in the urine.

The germs are conveyed from sick to healthy persons in almost the identical way as is the case in typhoid fever.

The reader is therefore referred to the description of typhoid fever given above for the details of disinfection and other preventive measures to be carried out against cholera.

DYSENTERY.

Dysentery is a communicable disease which may occur in epidemic form, especially in the Tropics or during the hot season of the year. It is sometimes called "epidemic dysentery" to distinguish it from "amebic dysentery." Epidemic dysentery is caused by the *Bacillus dysenteriæ*, a minute bacterial organism, while amebic dysentery is due to the *Entamœba histolytica*, an organism belonging to the animal kingdom. The former, then, is due to a bacterium, the latter to a protozoon. The two diseases, however, are contracted in much the same manner, i. e., by taking the organisms into the body through the mouth, usually with the food or drink.

The feces of patients having either one of these diseases contain the specific organism in large numbers. Therefore what has been stated with regard to the prevention of typhoid fever applies also to the prevention of both epidemic dysentery and amebic dysentery.

SMALLPOX—SCARLET FEVER—MEASLES—CHICKEN POX—ERYSIPELAS.

SMALLPOX.

The exact manner in which the virus of smallpox is given off from the body of the patient is not definitely known, but it is thought to be thrown off into the surrounding air, perhaps with the exhaled breath. The virus has been shown to be present in the eruption, whether fluid or dried in the crusts.

The infection of smallpox is thought to enter the body through the respiratory tract.

The preventive measures to be carried out against smallpox are, briefly stated, *vaccination, isolation* and *disinfection*.

Vaccination.—All persons should be vaccinated at least by the time they are a year old. If the vaccination does not "take," it should be repeated until it does "take," or until it is shown that the individual is definitely immune to vaccinia. Persons should be vaccinated again about every five years or whenever they are exposed to smallpox. Two or three successful vaccinations give practically complete immunity to smallpox.

Isolation.—Whenever possible, smallpox should be treated in an isolation hospital provided for contagious diseases. Where this is not practicable, a room should be used that is isolated as much as possible from the remainder of the building. The room, before being occupied by the patient, should have all unnecessary furniture hangings, draperies, carpets, etc., removed. It should be capable of being darkened and freely ventilated. There should be no communication with the patient except on the part of the necessary attendants, nurses, and the physician.

Disinfection.—Body clothing worn by the patient before taking to bed should be boiled or burned. All linen, garments, towels, etc., soiled or used by the patient should, as soon as they leave the patient, be immersed at least one hour in one of the following solutions:

Phenol, 5 per cent.
Chlorinated lime, 4 ounces to 1 gallon of water.

As a further measure of safety they should then be boiled, after which they may be laundered and again used, if desired.

Handkerchiefs or cloths soiled by secretions from the patient's nose and mouth had better be burned, though they may be disinfected, as stated above.

The urine and feces of smallpox patients are not supposed to contain the virus of smallpox, but it is desirable that they should be disinfected before disposing of them. They may be disinfected in any one of the ways described for the disinfection of typhoid excreta.

Eating utensils, medicine glasses, etc., used by the patient should be immersed in boiling water. Food that has been in the sick room, but not consumed, should either be burned or placed in boiling water. All disinfection should, as far as possible, be done in a room adjoining the sick room; or, if that is not available, in the sick room. Those temporarily entering the sick room should wear gowns provided for the purpose.

The nurse should wear clothing of material not injured by disinfectants, for these garments, as well as the doctor's gowns, should be disinfected.

The physician, nurses, etc., should wear gowns or, after being with the patient, should change their clothing before mingling with other persons. After handling the patient or any possibly infected material, the hands of the attendant should be washed for a few minutes in phenol solution 1 to 100, corrosive sublimate 1 to 1,000, or some other disinfectant solution. The floor of the sick room should occasionally be dampened with one of those solutions.

In cleaning the sick room the raising of dust should be guarded against by using a damp cloth or mop for the purposo, or by dampening the floor before sweeping it.

By applying a bland ointment such as vaseline, to the surface of the skin of the patient during the stage of desquamation, the dissemination of the exfoliated particles of skin, crusts, etc., may be largely prevented.

Smallpox probably is infective during the entire period of desquamation and the patient should be treated accordingly. When the patient is able to be up and desquamation is fairly well along, the body of the patient may be sponged daily with a 1 to 2,000 solution of corrosive sublimate. The patient should then occupy another room, at least until the original sick room can be disinfected. To do this, everything in the room should be left *in situ* and formaldehyde gas applied by one of the methods already described, preferably by the permanganate method. In rural districts where formaldehyde is not available sulphur dioxide with moisture (pot method) may be used as mentioned on page 32. Sulphur dioxide, however, is rather difficult to confine to one room.

After the gaseous disinfection is completed, the floor, tables, chairs, etc., should be washed with a 3 per cent solution of phenol or some other disinfectant solution. The mattress should be burned, and the bed linen, garments, and other articles in the room disinfected, as has already been stated.

Any room that may be occupied by the patient during the stage of desquamation should, when vacated, be disinfected in accordance with the rules that have been outlined above.

When the stage of desquamation is entirely over—that is, when the skin is smooth and scales or particles of skin are no longer being given off, even from the pocks of the scalp, the entire house may be disinfected with formaldehyde gas.

After the disinfection is over the room last occupied by the patient should be further treated, as has been stated.

In conclusion it must be emphasized that, while isolation and disinfection may play a part in the handling of smallpox, the one essential thing is vaccination, especially of the exposed or those likely to be exposed.

SCARLET FEVER.

Scarlet fever is a highly communicable disease, but the specific organism is not yet known. The infection is probably contained in the secretions of the nose and mouth, and possibly in the exfoliated particles of skin.

The trend of opinion at present is to regard the early stages of scarlet fever as the more infective.

Scarlet fever is analogous to smallpox from the standpoint of conveyance, prophylaxis, etc. Therefore, omitting the subject of vaccination, what has been outlined with regard to preventive measures, management, disinfection, etc., for smallpox applies almost equally well to scarlet fever.

All soiled linen, towels, bedclothes, etc., eating utensils, urine, feces, sputum, and nasal secretions and aural discharges should be disinfected; and the same care of the hands and of the floor, the same precautions as to the physician's gowns and the nurse's wearing apparel should be taken as have been already outlined above for smallpox.

During the desquamatory or peeling stage of scarlet fever the disease may be communicable, and this condition may exist until the stage of desquamation is entirely completed.

MEASLES.

Measles usually occurs in epidemic form. The infection is probably present in the secretions and in the skin, especially in the secretions of the nose and mouth very early in the disease.

Measles is probably spread in very much the same manner as smallpox and scarlet fever. Consequently the disinfection for measles is the same as that described for smallpox, to which the reader is referred.

CHICKEN POX.

The cause of chicken pox is unknown, but it is undoubtedly due to a specific infection.

The disease is highly "contagious" in the same sense that smallpox is, viz, by contact between the sick and the well. The disease is spread in much the same way and through about the same channels that smallpox spreads, and therefore the same disinfection measures that apply to smallpox apply to chicken pox.

ERYSIPELAS.

Erysipelas is communicable and is caused by the *Streptococcus erysipelatis.* The organism is contained in the pus and secretions from the seat of the inflammation, and also in the desquamating skin of those suffering with erysipelas.

It is not definitely known how the infection enters the system, but probably it is through the abraded skin or mucous membranes; at least, persons with wounds or abrasions of the skin are very susceptible to infection with erysipelas.

Patients suffering with erysipelas should be isolated and the disinfection measures for erysipelas carried out along the same general lines as have already been described for scarlet fever.

DIPHTHERIA—EPIDEMIC CEREBROSPINAL MENINGITIS—ACUTE ANTERIOR POLIOMYELITIS—INFLUENZA.

DIPHTHERIA.

The diphtheria bacillus is found in the secretions of the mouth, nose, and throat, and in the membrane from the site of the lesion in diphtheria. It may sometimes be found in the throats of persons showing no signs of the disease. It is not found in the air unless particles of secretions, membranes, etc., after drying, are blown about with the dust. The infection may be directly communicated from mouth to mouth by kissing, coughing, etc., or indirectly by objects that have become contaminated with the germs of the disease. It may also be spread by food, especially milk.

Isolation.—Isolation of diphtheria should be carried out as prescribed for smallpox.

Disinfection.—The germ being contained in the secretions of the nose, mouth, and throat, it is obvious that these secretions should be disinfected as soon as eliminated, and that cloths, handkerchiefs, etc., used to receive them should be disinfected or burned. Bed and body linen of the patient, when removed or soiled, should be immersed for one hour in one of the following solutions: Phenol, 5 per cent; formaldehyde solution, 5 per cent; corrosive sublimate, 1 to 1,000. The immersion in the formaldehyde solution can not be done in the sick room. Eating utensils, medicine glasses, etc., used by the patient should be disinfected by boiling. The thermometer, except when in use, should be kept in a 3 per cent solution of phenol. Brushes, swabs, etc., used about the patient's mouth should, when not in use, be kept in a weak (1 per cent) phenol solution, and when no longer required they should be burned.

The hands of attendants, after handling the patient or any material connected therewith, should be washed in a 1 to 100 solution of phenol or a 1 to 1,000 solution of corrosive sublimate.

Upon convalescence of the patient the entire house may be disinfected with formaldehyde gas, preferably by the permanganate method. The room in which the patient was sick should then be washed with a disinfectant solution, the mattress burned, and the bedding, etc., either disinfected as described above or boiled or burned.

The *Bacillus diphtheriæ* often exists in the throat or nose for some time after convalescence, therefore the patient should be kept isolated until bacteriological examinations no longer show the presence of the diphtheria organisms in the throat or nose.

EPIDEMIC CEREBROSPINAL MENINGITIS.

This is a communicable disease caused by the *Diplococcus intracellularis meningitidis*. The organism is found in the cerebrospinal fluid and in the nasal secretions. It is possible that it is sometimes contained in the sputum, urine, and feces.

The methods of conveyance of epidemic cerebrospinal meningitis are not yet definitely settled, but it seems very likely that it and diphtheria are communicated in very much the same way. The measures of isolation, disinfection, etc., prescribed for diphtheria may be enforced against meningitis. The causative organism of this disease is very easily killed by drying and probably never survives long outside the body, hence ordinarily measures of disinfection may be limited to treatment of discharges from the nose and throat. It is likely that healthy "carriers" of the meningococcus are the chief means by which the disease is spread, and the most promising means of combating it are found in the detection and isolation of these carriers.

ACUTE ANTERIOR POLIOMYELITIS.

This disease is also known as "epidemic poliomyelitis" and "infantile paralysis." The cause of the disease is unknown, but it has been definitely proven to be a communicable disease. It may occur in epidemic form. The infection has been shown to be contained in the nasal secretion, sputum, and feces of those having the disease, and of carriers.

The way in which the infection is communicated from sick to healthy persons is not well established.

It is not demonstrated that disinfection is competent to limit the spread of this disease, but measures intended to render harmless secretions of the nose and throat and intestinal discharges may be adopted.

There is laboratory evidence indicating that the phenol group of disinfectants is not so effective against the virus of poliomyelitis as are some other agents. Probably formaldehyde solution or corrosive sublimate would be more serviceable.

Inasmuch as insect transmission of this disease, though improbable, can not be absolutely excluded, fumigation with sulphur dioxide for the destruction of vermin may be employed.

INFLUENZA.

Influenza is a highly communicable disease, occurring in widespread epidemics. The organism is found in great numbers in the secretions of the nose and mouth of those suffering with the disease. The preventive measures for influenza should be carried out along the same lines as those prescribed for diphtheria.

TUBERCULOSIS—LEPROSY.

TUBERCULOSIS.

Tuberculosis is a communicable disease prevalent in all parts of the world.

Tuberculosis may affect any part of the human body, although the lungs are the parts most frequently affected, in which case the disease is often called "pulmonary tuberculosis," "consumption," etc. This variety of the disease is dangerously communicable and therefore will be especially considered here.

The bacillus of tuberculosis is usually contained in large numbers in the sputum of consumptives. It is very often contained in the nasal secretion and feces and sometimes in the urine. It is obvious that the germs may be scattered far and wide by the constant coughing and spitting attending consumption. The dried secretions containing the organisms may mix with the air and dust and thus be inhaled into the lungs of healthy persons.

The germs may also be communicated in many other ways, as, for instance, in the common use by healthy persons and consumptives of drinking cups, or glasses, towels, tableware, eating utensils, beds, berths, etc.; by kissing; by coughing; through the food, especially milk and meat from tuberculous animals; and by the association or living of healthy persons with consumptives. It is largely by means of the sputum in the moist condition, in the tiny droplets expelled by sneezing or coughing, that a consumptive infects another person. It seems likely that it is during the early years of life that the greater risk of infection arises.

Isolation.—A consumptive should be isolated, though not in the strict meaning of the term as applied to smallpox or scarlet fever. The patient should sleep alone, whether it be in a room, a tent, or in the open. If a room is used, it should be one that is isolated as much as possible from the remainder of the building. It should preferably be on the sunny side of the house and well ventilated. Consumptives that are able to be up and around should spend their time, as far as possible, in the open air, but when indoors they should occupy their own rooms. The consumptive's room should be frequented only by those having duties to perform therein.

Disinfection.—Be careful to destroy all the sputum of consumptives. The germ of tuberculosis is easily killed by heat, but it is rather difficult to kill it with chemical disinfectants, especially when it is incorporated with sputum. Therefore the sputum from a consumptive should, as far as possible, either be burned or boiled.

Portable spit cups that are destructible and cheap should be used by consumptives, and after a cup has been in use a few hours it should be burned. If indestructible cups are used, they should contain, while in use, a small quantity of a 5 per cent solution of phenol or a solution of chlorinated lime, and they should be disinfected each day by boiling them and their contents in water. Consumptives should expectorate only into their own private cups or into the fire. During the act of coughing consumptives should hold a handkerchief before the mouth in order to catch the particles of sputum expelled.

Napkins, handkerchiefs, bed and body linen, etc., used by consumptives should be disinfected in boiling water. Eating utensils, drinking cups, medicine glasses, etc., should also be disinfected in boiling water, and under no conditions should they be used by healthy persons until they have been disinfected.

The floor of a consumptive's room should occasionally be mopped with a disinfectant solution. The floor should never be swept without guarding against the raising of dust; either it should be dampened before it is swept or damp mops or cloths should be used for cleaning it.

Consumptives, when not confined to the bed, should occasionally wash their hands in a disinfectant solution, such as 1 per cent phenol or its equivalent. After handling a consumptive or any infected material the hands of the attendant should be washed in one of the solutions just mentioned.

Upon the permanent vacation of the quarters occupied by a consumptive, whether through death, removal, or recovery, the room, and preferably the entire building, may be disinfected with formaldeyhde gas. The treatment of the room, bedding, etc., following the gaseous disinfection should be as has been prescribed for smallpox.

LEPROSY.

Leprosy probably is less communicable than tuberculosis. The germs of leprosy are contained in the lesions of leprosy in enormous numbers, and are thrown off with certain discharges from the lesions of those suffering with the disease. The nasal secretions of lepers often contain the germs in large numbers, and many of them are eliminated in these secretions.

In this disease disinfection is a matter of but slight importance compared with isolation of the sick. We are in ignorance of the means by which infection occurs, though we know that the disease is communicable. Disinfection may be carried out in the same manner as for tuberculosis. It would certainly be comforting to know that quarters which had been occupied by a leper had been disinfected, even though we have no assurance that the measures are necessary to prevent infection.

PLAGUE—TYPHUS FEVER—YELLOW FEVER—MALARIA—DENGUE.

PLAGUE.

Plague occurs in two types, the pneumonic in which the germs leave the body by the expectoration, and the bubonic, which depends on the rat (sometimes other rodents) and the flea as a means of transmission. These two types of the disease require radically different handling from the point of view of disinfection.

So far as we know, it has not been shown that measures of disinfection have any value in the pneumonic form of the disease; but the measures that might properly be applied are those applicable to scarlet fever; i. e., destruction or sterilization of discharges from the body, especially those from the air passages.

In the bubonic form of plague the only measures worthy of consideration are those directed to the destruction of rodents and their parasites. This may be accomplished by the use of traps, poisons, hydrocyanic acid gas and sulphur dioxide, and as soon as the animals are killed they should be burned. The floor of the room occupied by a plague patient may be mopped occasionally with kerosene in order to kill fleas and other insects.

Sweepings from the room should be burned. Sputum, feces, urine, and other discharges from the patient may be disinfected with one of the following solutions: Five per cent phenol, 5 per cent formaldehyde solution, chlorinated lime, etc. Soiled bed linen, towels, handkerchiefs, and other objects that have come in contact with the patient may be disinfected by immersion in one of the disinfectant solutions just mentioned or by boiling. The hands of the nurse should be washed in a solution of phenol or corrosive sublimate.

Upon the termination of the disease the room should be fumigated with sulphur dioxide or hydrocyanic acid gas to kill vermin. Following this fumigation, the mattress should be burned, the bedclothes, etc., burned or boiled, and if fleas or other vermin are present they should be killed with boiling water, gasoline, or in some other way.

TYPHUS FEVER.

Typhus fever, also known as spotted fever, jail fever, ship fever, tabardillo, etc., is a communicable disease, the cause of which is unknown. The disease is conveyed by the body louse, *Pediculus vestimenti.*[1] The louse, by biting a patient suffering with typhus fever, becomes infected, and it may then transfer the infection to healthy persons by biting them.

Patients suffering with typhus fever should be isolated lest healthy persons entering the sick room become infested with infected lice.

Disinfection.—The preventive measures carried out should be directed toward the destruction of the louse. When a case of typhus fever is discovered the patient's clothing should be removed and immediately boiled or otherwise treated in order to kill the lice and their eggs. Another bed should be provided for the patient and the framework of the one just vacated should be scalded with boiling water or the lice killed in some other way. The mattress and bed clothing should be treated so as to destroy the lice. Parts of the room likely to harbor lice should be scalded with boiling water. The patient's hair should be trimmed and that removed should be burned. The scalp should be treated with equal parts of kerosene and olive oil to destroy head lice, and the same mixture may be used on the body. The discharges from the patient probably do not contain the infection of typhus fever; therefore their disinfection is considered unnecessary.

Following the removal of the patient from the room, the mattress, bed clothing, etc., should be treated as above stated, and then the room should be given a thorough fumigation with sulphur dioxide, as has been prescribed for the destruction of lice. Following the fumigation, the framework of the bed, the floor, walls, etc., of the room should be soaked with boiling water or saturated with petroleum, gasoline, or some other method of killing lice employed. Carbon bisulphide has been used for louse destruction, being vaporized from pans and about 100 cc. employed per cubic meter of space, with an exposure of four hours. Clothing may be treated in a tight box using the proportion of carbon bisulphide mentioned above.

Dry heat is very effective in destroying lice and their ova. A temperature of 80° C. continued for one hour will prove sufficient. Moist heat is also very efficient for louse destruction, and when practicable may be employed to advantage in the form of streaming steam or steam under pressure.

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[1] Public Health Reports, vol. 25, Feb. 18, 1910, p. 177.

For the bathing of louse-infested persons a spray of a soap-gasoline emulsion has been employed. The spray is made by mixing—

Soap chips	1 part.
Soft water	4 parts.
Gasoline	4 parts.

YELLOW FEVER.

Yellow fever is a communicable disease, the cause of which has not yet been discovered. The disease is transmitted by the bite of a mosquito, the *Aedes calopus*. About 14 days after becoming infected, the mosquito may transmit the disease to nonimmune persons by biting them; this it may do during the remainder of its life. It is only in the manner stated that yellow fever is transmitted from sick to healthy persons.

The preventive measures against yellow fever consist of screening the patient and the destruction of the mosquito. The patient, therefore, should be kept in a well-screened room, and as a further precaution, in a bed covered with mosquito netting.

Following the removal of the patient, the room, and preferably the entire building, should be fumigated with sulphur dioxide, as described on page 31. Pyrethrum may be used, but it is not nearly so efficient for killing mosquitoes as is sulphur dioxide.

MALARIA AND DENGUE.

Malaria and dengue are both transmitted by mosquitoes, and while the destruction of infected insects plays but a small part in the eradication of these diseases, the methods described under yellow fever are applicable, if considered necessary.

RELATED PUBLICATIONS.

(Available literature bearing upon the subject of disinfection issued by the Public Health Service. Bulletins marked with an asterisk may be obtained, at the price noted, from the Superintendent of Documents, Washington, D. C.; other bulletins may be obtained *without cost* from the United States Public Health Service, Washington, D. C.)

HYGIENIC LABORATORY BULLETINS.

2. Formalin Disinfection of Baggage without Apparatus. By M. J. Rosenau. 1900. 34 pages. Paper.

*39. The Antiseptic and Germicidal Properties of Solutions of Formaldehyde and their Action upon Toxins. By John F. Anderson. July, 1907. 48 pages. Paper. 10 cents.

*56. Milk and Its Relation to the Public Health. (Revised and enlarged edition of Bulletin No. 41.) By various authors. March, 1909. 828 pages. 67 charts and illustrations. Paper. $1.00.

21. Pasteurization. By M. J. Rosenau.

22. The Thermal Death Points of Pathogenic Microorganisms in Milk. By M. J. Rosenau.

*57. II. The Viability of the Tubercle Bacillus. By M. J. Rosenau. September, 1909. 42 pages. Bibliography. Paper, 5 cents.

*82. I. Method of Standardizing Disinfectants with and without Organic Matter. By John F. Anderson and Thomas B. McClintic.

II. The Determination of the Phenol Coefficient of Some Commercial Disinfectants. By Thomas B. McClintic. February, 1912. 74 pages. 4 figures. 53 tables. Paper. 10 cents.

*88. Method for Determining the Toxicity of Coal-Tar Disinfectants, together with a Report on the Relative Toxicity of Some Commercial Disinfectants. By Worth Hale. April, 1913. 46 pages. Paper. 5 cents.

101. IV. The Sterilization of Dental Instruments. By H. E. Hasseltine.
Reissued as "Reprint A from Hygienic Laboratory Bulletin No. 101." October, 1915.

108. Experimental Studies with Muscicides and other Fly-destroying agencies. By Earle B. Phelps and Albert F. Stevenson. December, 1916.

PUBLIC HEALTH BULLETINS.

*34. Maritime Quarantine. By L. E. Cofer. 1910. 25 illustrations. 64 pages. Paper. 20 cents.

Appendix—Disinfectants Authorized by United States Quarantine Regulations and the Proper Method of Generating and Using Same.

42. Disinfectants: Their Use and Application in the Prevention of Communicable Diseases. Revision of Public Health Bulletin No. 42 by George W. McCoy, Arthur M. Stimson, and H. E. Hasseltine.

PUBLIC HEALTH REPORTS.

March 16, 1917. Rack and Disinfector for Clinical Thermometers. A convenient portable apparatus. By B. E. Holsendorf.

March 23, 1917. Combating Typhus Fever on the Mexican Border. By C. C. Pierce.

April 20, 1917. Detection of Hydrocyanic Acid Gas. Use of small animals for this purpose. By S. B. Grubbs.

REPRINTS FROM PUBLIC HEALTH REPORTS.

*59. Report on an Original Form of Sulphur Burner for Disinfection. By N. Roberts and F. Alex. McDermott. March 31, 1911. 10 pages. 2 charts. 1 il. Paper. 5 cents.

132. Fumigation of Vessels for the Destruction of Rats. By S. B. Grubbs. June 20, 1913.

151. The Sale of Bichloride Tablets. A Discussion of the need for restriction of the sale and distribution of bichloride of mercury tablets. By Martin I. Wilbert. November 14, 1913.

176. Car Sanitation. Cleansing and disinfection of railroad coaches. A report of methods used at Asheville, N. C. By A. D. Foster. March 27, 1914.

225. The Chemical Disinfection of Water. By Earle B. Phelps. October 9, 1914.

239. Cyanide Fumigation of Ships. Method used at New Orleans. By Norman Roberts. December 11, 1914.

247. Sewage Disinfection for Vessels and Railway Coaches. By Leslie C. Frank. January 1, 1915.

*261. Hypochlorite Treatment of Water Supplies. Portable plant and field equipment for its administration. By H. A. Whittaker. February 26, 1915. 5 cents.

287. The Practical Use of Disinfectants. By H. E. Hasseltine. July 2, 1915.

*292. Embalming. Indefinite preservation of the body. By Edward Francis. July 30, 1915. 5 cents.

293. Methods of Destroying Lice. Abstract of article by J. Parlane Kinloch, M. D. August 6, 1915.

299. Essentials of Swimming-Pool Sanitation. By Wallace A. Manheimer, Ph. D. September 17, 1915.

*304. An Efficient Liquid Disinfectant. A formula by which one can be readily prepared. By Albert F. Stevenson. October 8, 1915. 5 cents.

313. Hydrocyanic Acid Gas. Its practical use as a routine fumigant. By R. H. Creel, F. M. Faget, and W. D. Wrightson. December 3, 1915.

336. Some Fallacies Regarding Phenol. A review with reports of observations on the influence of ethyl alcohol on the germicidal and on the toxic properties of phenol. By Martin I. Wilbert. April 28, 1916.

343. Cyanide Gas for the Destruction of Insects. With special reference to mosquitoes, fleas, body lice, and bedbugs. By R. H. Creel and F. M. Faget. June 9, 1916.

351. Artificial Purification of Oysters. A report of experiments upon the purification of polluted oysters by placing them in water to which calcium hypochlorite has been added. By William Firth Wells. July 14, 1916.

356. The Sanitation of Railway Cars. By Thomas R. Crowder. August 11, 1916.

368. Drinking Water on Interstate Carriers. A study of conditions on steam vessels engaged in interstate commerce in the sanitary district of the Great Lakes. By J. O. Cobb, C. L. Williams, and H. P. Letton. October 13, 1916.

370. Destroying Lice on Typhus Fever Suspects. By S. B. Grubbs. October 20, 1916.

374. Fly Poisons. Studies on sodium salicylate, a new muscicide, and on the use of formaldehyde. By Earle B. Phelps and Albert F. Stevenson. November 3, 1916.

385. Laundries and the Public Health. A sanitary study, including bacteriologic tests. By M. C. Schroeder and S. G. Southerland. February 9, 1917.

404. Chemical Closets.

MISCELLANEOUS PUBLICATIONS.

1. Interstate Quarantine Regulations of the United States. 1916. 41 pages.
7. Quarantine Laws and Regulations of the United States. Revised October, 1910. 52 pages.

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TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States

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PUBLIC HEALTH BULLETIN No. 43

APRIL, 1911

I. STUDIES UPON PLAGUE IN GROUND SQUIRRELS (IN FOUR PARTS)

- PART I. Pathology and bacteriology of plague in ground squirrels
- PART II. Notes on induced plague in ground squirrels
- PART III. Immunity of certain squirrels to plague infection
- PART IV. Insect transmission in relation to plague among ground squirrels

II. A PLAGUE-LIKE DISEASE OF RODENTS

BY

GEORGE W. McCOY
Passed Assistant Surgeon

PREPARED BY DIRECTION OF THE SURGEON-GENERAL

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STUDIES UPON PLAGUE IN GROUND SQUIRRELS.

[From the Federal laboratory, San Francisco, Cal.]

By George W. McCoy,
Passed Assistant Surgeon.

Part I.—PATHOLOGY AND BACTERIOLOGY OF PLAGUE IN GROUND SQUIRRELS.[1]

PATHOLOGY.

This report is based upon the examination of 246 naturally infected plague squirrels that have come under observation at the Federal laboratory during the past two years. Our experience with this number has given us fairly well defined ideas as to the appearance of these rodents when infected with this disease. It is probable that we have seen practically all of the pathological changes found in plague in ground squirrels and it is believed that the tabulations of the various lesions represent with reasonable accuracy their average frequency. The majority of the cases in this report have been verified by the isolation of the pest bacillus directly from the squirrel, or from a laboratory animal inoculated from a squirrel. A smaller number have been diagnosed upon the evidence furnished by the gross lesions in inoculated rodents, and upon the results of the examination of stained smears either from the naturally infected squirrel, or from the inoculated animal showing the characteristic lesions of plague. This evidence was regarded as sufficient only when other rodents from the same vicinity had been proven by a more complete examination to be infected.

The method of dissecting squirrels requires no special description. The peripheral lymphatic glands must be completely exposed. The abdominal and the thoracic cavities must be freely opened. Some of our assistants have become very rapid and proficient in dissecting these rodents, one of them having opened and examined over 800 in one day.

In the early part of the work, smears were made routinely from many squirrels that showed no lesions, but it was found that the results did not justify the time consumed. It may be stated that, as is generally true of other animals, man, rats, or guinea pigs, unless there is some pathological change distinguishable to the naked eye, it is unnecessary to examine microscopically smear preparations from the rodents.

---

[1] In this bulletin the term squirrel or ground squirrel always refers to the California ground squirrel (*Citellus beecheyi*, Richardson).

GROSS LESIONS.

The study of the gross lesions of natural squirrel plague has been somewhat complicated by the fact that the majority of the animals we received had been shot. The traumatism often destroyed relations, and led to hemorrhages that obscured lesions. In other cases the decomposition changes that had occurred led to alterations of color for which certain allowances had to be made.

CLASSIFICATION.

As is true of almost any infectious disease, the division of cases into several classes is somewhat artificial, but it is convenient for purposes of study, and may be adopted profitably. It is customary to classify the lesions of plague in rodents into the acute, and the subacute or chronic. In studying plague in ground squirrels, a purulent bubo without any other lesion is found to be so common that it is convenient to regard these cases as forming a separate class. For the purpose of this report, we divide the lesions of the disease in squirrels into acute plague, subacute plague, and residual plague buboes.

The following table compiled from our records shows the frequency of the several classes of cases, together with the facts in regard to the way the animals were secured, the size, and the sex:

Type of cases.	How taken.				Size.					Sex.			Total.
	Shot.	Found dead.	Alive (died in captivity).	Trapped.	Grown.	Three-quarter grown.	Half grown.	One - quarter grown.	Not stated.	Male.	Female.	Not stated.	
Subacute	133	16	2	1	105	24	19	......	4	89	55	8	152
Acute	50	9	......	1	30	11	16	3	......	35	22	3	60
Residual buboes	32	2	.....	....	22	3	6	......	3	17	14	3	34
Total	215	27	2	2	157	38	41	3	7	141	91	14	246

LOCATION OF LYMPH GLANDS IN SQUIRRELS.

Before proceeding to a detailed consideration of the various types of cases, it is necessary to say a few words about the location of the lymphatic glands in squirrels. This is particularly important, as one or more of them will be found involved in about 84 per cent of all cases of plague.

The lymph glands in the neck are four or five in number on each side. They lie in a curved line around a large median structure, probably the thyroid. The axillary gland deserves no particular mention except the statement that it often rests in the center of a pinkish fatty mass which at first glance may be mistaken for diseased lymphatic tissue. The glands draining the posterior part of the body always require the most careful examination, as they are more frequently involved than those in the anterior part (axilla and cervical region). The lymph glands of the inguinal region and of the pelvis are found in three localities. The median inguinal is found near the midline just above the pubis. This structure is wanting in rats and in guinea pigs, but is constant in ground squirrels. Rather well back in the groin is found a chain of glands which often extends almost to the spinal column. We call these the posterior inguinal. The third set are those spoken of as pelvic glands. They are two in number, one on each side, and lie just at the bifurcation of the aorta. Analogous lymph nodes are found in other rodents.

The following table shows the frequency with which the several glands and groups of glands are involved in the various classes of cases:

Type of cases.	Total.	Location of bubo.					Multiple.		
		Cervical.	Axillary.	Median inguinal.	Posterior inguinal.	Pelvic.			
Acute	60	11	5	14	4	9	17	Axillary with inguinal Cervical with inguinal Multiple inguinal or inguinal with pelvic	3 3 11
Subacute	112	28	8	32	8	8	28	Bilateral axillary Axillary with inguinal Cervical with inguinal or pelvic Multiple inguinal or inguinal with pelvic	1 1 7 19
Residual buboes	34	7	1	10	6	4	6	Cervical with inguinal Multiple inguinal or inguinal with pelvic	2 4
Total with buboes	206	46	14	56	18	21			51

We have never seen a mesenteric bubo. In one case in which there was a cervical adenitis, a caseous gland was found just behind the sternum. The bubo in any of the types is frequently so large that it forms a distinct tumor mass readily recognized before an incision is made.

ACUTE PLAGUE.

We include here only those cases in which we found one or more hemorrhagic buboes without macroscopic necrotic foci in the internal organs. (Pl. I, fig. 1.) These constitute 24.4 per cent of the cases embraced in this report. The gland is very commonly completely or partially surrounded by a bloody area. Occasionally a gelatinous exudate is found in the region. The contents of the bubo is dry, mealy, salmon colored, frankly bloody or blood tinged. A characteristic hemorrhagic gland may be present without any surrounding exudate. In a considerable number of cases the bubo will show a few points of blood-tinged pus, or the whole contents may be made up of grumous reddish purulent matter. Small subserous hemorrhages are found occasionally, particularly under the visceral pleura. Aside from a bubo, enlargement of the spleen was the most conspicuous lesion. This organ was usually deep red in color and quite firm in consistency. When decomposition had occurred it was soft and often slate colored. Occasionally it showed fine hemorrhagic points. It sometimes happened that we found buboes of different stages in the same animal; for example, a purulent cervical would be present along with caseous hemorrhagic inguinal glands.

SUBACUTE PLAGUE.

Under this head we have placed all cases in which there was a caseous bubo without evidence of surrounding hemorrhage, with or without macroscopic lesions of the internal organs; and those in which there were gross changes in the internal organs alone. The post-mortem findings varied greatly. A very few caseous granules in the spleen (Pl. I, fig. 2), or an abscess in the liver, sometimes constituted the only evidence of infection; on the other hand, we might have several necrotic glands and numerous large caseous foci in the liver, spleen, and lungs. The majority, however, presented a bubo along with foci in the spleen or the liver or both. This group contains 61.8 per cent of all cases considered; 73.7 per cent of them had buboes. The buboes were sometimes very large. It was not a very rare thing to encounter a cheesy gland 1.5 cm. in the long diameter. More frequently they were about 0.5 cm. through and contained a few necrotic points. Occasionally a pea-sized cheesy or purulent mass was found replacing part of the gland tissue. In some cases on account of numerous abscesses a honeycombed appearance resulted.

There was even more variation in the lesions in the internal organs than in the buboes. Cheesy or purulent foci were frequently found in the spleen, in the liver, in the lungs, or in two or more of these organs. The necrotic change was more commonly seen in the spleen than in the other organs. The nodules and the abscesses in the spleen may be very large. (Pl. II, figs. 3 and 4.) We have seen them almost as large as the last joint of one's little finger. In other cases numerous small purulent points may be found scattered throughout the organ. There was one case in which the only lesion was an abscess about 1 cm. in diameter in the dome of the liver, the diaphragm being adherent over the surface of the organ.

Lungs.—We may have here either a pneumonic consolidation (Pl. III, fig. 5) usually rather grayish in color, or caseous or purulent areas (Pl. III, fig. 6; Pl. IV, fig. 7) similar to those found in the liver and the spleen. Caseous areas, especially the larger ones, sometimes appear to be in process of organization. This is true of the spleen and liver as well as of the lungs. In one case, a large abscess was found in the omentum, while in another, numerous small purulent foci were present.

Frequency of various lesions.—The following tabulation shows the frequency of lesions of the internal organs:

Organs involved.	Cases with—	
	Buboes and internal lesions.	Internal lesions only.
Spleen alone	17	9
Liver alone	6	8
Lungs alone	7	1
Spleen, liver, and lungs	6	3
Spleen and liver	26	17
Spleen and lungs	4	1
Liver and lungs	4	1
Total	70	40
Total cases spleen	53	30
Total cases liver	42	29
Total cases lungs	21	6

Adhesions.—Adhesions of serous surfaces were occasionally observed. When a lung was involved it was frequently adherent to the parietal pleura. When the liver was affected, the organ was often bound to the diaphragm. In a few cases the spleen was found to be adherent to the liver, to the abdominal wall, or to the omentum.

Jaundice was seen in several of the subacute cases, as well as in a few of the acute ones.

RESIDUAL BUBOES.

Under this head, we have considered those cases in which the only lesion was one or more purulent lymphatic glands. These constituted 13.8 per cent of all considered. Each one was verified by the inoculation of one or more laboratory animals. The glands were frankly purulent, the mass of pus usually being about as large as a pea (Pl. IV, fig. 8); occasionally it was much smaller than this, or the necrotic change was confined to a few points the size of a mustard seed. Sometimes the abscesses were very large, several being over 1 cm. in diameter. Quite often the process of softening was confined to a part of the gland, the remainder being fleshy looking, but without gross pathological changes. The pus was generally slightly yellowish, but never bloody.

The subacute cases were found at times in the same vicinity from which acute plague came; but occasionally they were received from sections of the country from which no other class of cases was secured. Probably it is largely a matter of accident that determines what type of squirrel plague is obtained from a given locality, as it is not likely that even in the districts where the most extensive shooting has been done we secure more than one out of every thousand infected animals.

GENERAL CONSIDERATIONS OF LESIONS.

When we compare the lesions of natural plague in the ground squirrel with those of the disease in other animals, the most striking feature is the extensive variations in the anatomical changes presented by the different examples of squirrel plague. In man, in rats, and in guinea pigs, the lesions in the great majority of cases are very uniform and constant. The subacute and chronic forms that constitute such a large percentage of the cases among squirrels are comparatively rare in other species. Squirrels are more closely related to the guinea pig than to most other rodents in which plague has been studied, but the guinea pig is notoriously susceptible and, as is well known, nearly always dies of acute plague when infected with a virulent culture. In a general way, we may say that lesions analogous to all of those observed in plague in squirrels may be seen in other animals, but that the percentage of types differs markedly. The acute type, which predominates in rats and in guinea pigs, is comparatively infrequent in squirrels, while the subacute type and residual lesions, so commonly seen in the latter, are relatively rare in the other rodents mentioned.

PLAGUE-LIKE DISEASE OF SQUIRRELS.

We have observed among squirrels an infection the lesions of which resemble plague very closely—so closely that even those who have had a large experience with both diseases may at times be unable to correctly judge as to whether the lesions in a given case are those of plague or of the plague-like disease. We may remark here that this disease causes plague-like lesions in the guinea pig and in certain other animals.

NEGATIVE CASES.

About 400 squirrels that were submitted to the inoculation test proved negative for plague. The cases fall into two classes: (1) Those which by bacteriological examination we were able to determine to be diseases other than plague; (2) those which we were unable to definitely diagnose. In the first class comes the above-mentioned plague-like disease and tuberculosis. The latter is very rare, but at least three cases have come under observation.

The second group comprises almost every conceivable lesion found in rodents. The fact was borne in mind that very little was known of the pathology of squirrel plague, and an animal presenting any abnormality that in the slightest degree aroused our suspicions was submitted to the inoculation test. The majority showed purulent lymph glands, many of which were microscopically indistinguishable from those we have called residual buboes. Others had abscesses in the viscera, especially in the spleen and the liver. Many of the rodents that had purulent lymph glands, with or without necrotic foci in the internal organs, were certainly examples of plague that had recovered. Such lesions are by no means common in squirrels, and the majority of the rodents in which they were found came from ranches and from localities that furnished infected animals.

Extensive adhesions of the liver to the diaphragm were very commonly met with in squirrels that had no other lesions. The animals almost always came from localities from which we had secured infected rodents.

SEASONAL PREVALENCE.

From the beginning of our work with plague infection in squirrels, the question has been kept before us as to whether there is any seasonal prevalence of the disease among these animals. It has been conclusively shown [1] that in certain parts of India there is a seasonal prevalence of rat plague, and that this coincides with epidemics of human plague. Without taking into consideration the distribution by months of cases of human plague of squirrel origin, which would introduce factors that need not be considered here, we may say that we have no reason for believing that squirrel plague is any more prevalent at one season of the year than at another. The figures for the cases by months have very marked variations, but a closer investigation shows that this is probably due to the changes in locations from which squirrels were sent. On one ranch that was found to be infected in June and July, 1909, infection was found again in January, 1910, and in June, 1910. We were inclined to believe that the disease prevailed most extensively during the summer until a heavy infection was found among the squirrels in Alameda County, Cal., in January 1910.

BACTERIOLOGY.

The bacteriology of squirrel plague does not differ materially from that of the disease in other animals. The organism, isolated either directly from a naturally infected squirrel or from a laboratory animal inoculated from a squirrel, is found to agree with the plague bacillus isolated from other sources. The evidence upon which the diagnosis of squirrel plague is based was discussed somewhat fully in a previous paper.[1] It is sufficient to summarize this data by saying that a bacillus which is morphologically and culturally indistinguishable from *B. pestis* isolated from human beings and from rats in this country and abroad has been isolated from ground squirrels. This organism is pathogenic for the animals, guinea pigs, rats, mice, rabbits, and cats, which the pest bacillus is recognized as being capable of infecting; and does not affect certain animals, dogs and pigeons, that are known to be immune to *B. pestis;* furthermore, this organism has its pathogenic properties neutralized or diminished by the simultaneous injection of antipest serum made by the immunization of animals to foreign strains of the plague bacillus.

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[1] Journal of Hygiene, Vol. VIII, No. 2, May, 1908, p. 266.

Theoretically it should have been possible to isolate the pest bacillus directly from the tissues of a large percentage of the infected squirrels. Practically this was not very often done, as the vast majority that were received had been shot at least 48 hours before they reached the laboratory. In most of them decomposition changes had begun, and in many were well advanced. While in some of these cases it would have been quite possible to have isolated the bacillus by cultural methods, the time consumed would have been greater than we could give to the work. It was a much more simple and certain procedure to inoculate a guinea pig or a white rat, and secure a culture from it. Another reason for the use of laboratory animals in this connection is the fact that while the cultural peculiarities of the pest bacillus are so well marked that the organism is not likely to be confused with any other, still in order to establish the diagnosis it is generally desirable to resort to inoculation experiments. It was just as satisfactory, and infinitely more convenient, to make the inoculation of a laboratory animal the first step in the procedure for identifying the organism as to make it the last one. We did not isolate *B. pestis* from all of the squirrels that were diagnosed and reported as plague infected. In a few cases when typical gross lesions were associated with characteristic organisms in smears, a diagnosis was made even if the effort to isolate the pest bacillus by cultural methods failed. In other cases the diagnosis was made when the gross lesions of plague were found at the post-mortem examination of an inoculated guinea pig or white rat, and when staining of smears from the tissues of the laboratory animal showed an abundance of typical bacilli. Cultures were nearly always made from the inoculated animals, but it occasionally happened that the growth was so badly contaminated that we failed to isolate the plague bacillus.

Unfortunately, it happened that frequently so large a number of suspected squirrels came to the laboratory on the same day as to make it impracticable for want of time, and for lack of space in which to keep inoculated guinea pigs or white rats, to verify all of them by animal tests or by cultural studies.

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[1] Public Health Reports, Vol. XXV, No. 2, Jan. 14, 1910, pp. 27-33.

MORPHOLOGICAL FINDINGS.

In the pathological classification of the lesions, those showing the presence of bacilli in smears were confined to two classes, the acute and the subacute. The lesions which were interpreted as representing convalescent stages of the disease were those that failed to show the bacilli in stained smear preparations or showed them in such small number as to be entitled to no weight in arriving at a diagnosis. The following table shows the frequency with which bacilli were found in cases in which the result of the microscopical examination was noted:

	Acute plague.	Subacute plague.
Present:		
Numerous	19	32
Few	12	13
Doubtful	5	17
Absent	6	74

Percentage of cases showing bacilli:	
Acute plague	71.4
Subacute plague	33.0

When bacilli were recorded as "numerous" they were so plentiful as to cover practically the whole field; by "few" we mean several characteristic bacilli in a field; by "doubtful" we refer to those cases which showed in smears a very small number of organisms morphologically resembling the plague bacillus. These were cases in which the microscopical findings were considered as negative in reaching a conclusion as to the condition present. For practical purposes they may be classed with those in which bacilli were absent. When only an occasional pest-like organism was found, as well as when none at all were present, the record was made to read "absent." This is justified by the fact that many bacteria are morphologically very likely to be mistaken for *B. pestis,* but they are almost invariably few in number compared to the number of plague bacilli usually found in smears.

The organisms are not always uniformly distributed throughout an affected tissue. Smears from different parts of a lesion may give different appearances. It happened several times that a smear made from a bubo was negative, while a second one from another part of the same gland presented a typical appearance. When characteristic bacilli were present they were not always found in all of the lesions. Thus, while they were more often present in the bubo than in the internal organs, it occasionally happened that they were found in great abundance in the viscera and were absent from the bubo. One rather remarkable fact in connection with the examination of stained smear preparations was the occasional finding of cases that yielded the involution forms that are so frequently found in old cultures of the plague bacillus and are so characteristic of the growth on salt agar. By involution forms we mean, not the spherical (coccoid) forms which are found usually in considerable numbers in pest smears from almost any source, but the large spherical, flask-shaped, hourglass, and dumb-bell forms.

CULTURAL INVESTIGATIONS.

Cultures from the infected squirrels or from an inoculated animal were made on agar slants. The needle was drawn over the surface of the slant two or three times, and frequently a second (and occasionally a third) tube was streaked with the needle after the inoculation of the first one. In the majority of cases, a pure culture was obtained. Occasionally colonies were present that were obviously due to the growth of a contaminating organism. In these instances a colony of what was believed to be *B. pestis* was "fished" with an inoculating needle and transferred to a second tube. After a study of the growth, cultures were always made upon 3 per cent salt agar, in broth and in litmus milk. After 24 or 48 hours at 37° C. the salt agar culture was examined for the characteristic involution forms. The broth tube was kept until a delicate surface film and flocculi suspended in the media were observed. The reading of the litmus milk was made after an incubation of 2 or 3 days at 37° C. and a further period of a week or longer at room temperature. Litmus milk was used for the purpose of excluding the *Bacillus pseudotuberculosis rodentium*, Pfeiffer. It is well known that this organism not only resembles the pest bacillus morphologically and culturally, but also produces plague-like lesions in guinea pigs. We have constantly borne this in mind and have used the greatest care to prevent any confusion or error due to the presence of this micro-organism. One of the chief points of difference[1] between it and the pest bacillus is the reaction on litmus milk, *B. pestis* producing no change or a trifling degree of acidity, while *B. pseudotuberculosis rodentium*, Pfeiffer, renders it strongly alkaline. It is for this reason that in addition to the media usually employed in the identification of *B. pestis*, we have used litmus milk. The plague bacillus gives no characteristic reactions on media other than those mentioned, but as a matter of routine, cultures have occasionally been made on sugar broths, blood serum, potato, and gelatin. There was no gas formation in either glucose or lactose, though the former was rendered slightly acid. No visible growth appeared on potato. There was no liquefaction of gelatin.

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[1] MacConkey; Journal of Hygiene, Vol. VIII, No. 3, June, 1908, p. 335.

In another part of this bulletin a plague-like disease in ground squirrels is discussed. A clear distinction is to be made between a plague-like disease and a pestis-like organism. While plague-like diseases have been observed, none of them has been found to be due to an organism resembling the plague bacillus, nor indeed has any such organism been found during the course of this work.

INOCULATION OF ANIMALS.

VIRULENCE FOR GUINEA PIGS AND WHITE RATS.

Guinea pigs and white rats are so susceptible to infection with *B. pestis* that they are indispensable in laboratory work with plague. We have used guinea pigs much more extensively than white rats as early in our work it was found that squirrel plague frequently failed to infect white rats when inoculated with the same material that was successfully used on guinea pigs. In one series [1] in which tissue from 11 squirrels was used to inoculate guinea pigs and white rats (one of each in each case), all of the guinea pigs died of plague while 2 of the 11 white rats remained well. In other words, had we depended for the diagnosis upon the inoculation of white rats, 2 of the 11 cases would have been missed. It is not believed that the relative immunity of white rats is due to any peculiarity of the pest bacilli in squirrels other than that of somewhat reduced virulence. It is well known that as a rule white rats are not so easily infected with *B. pestis* as are guinea pigs. Even guinea pigs are not uniformly susceptible; thus it has happened, though very rarely, that when two were inoculated from the same tissue, one would perish while the other either developed plague from which it recovered or escaped entirely. That an occasional guinea pig is immune is well demonstrated by a recent experience at the Federal laboratory. Two guinea pigs were inoculated with the same dose of plague culture; one died on the seventh day, while the other remained well.

In the inoculation of animals, we used such tissues as we thought were most likely to reproduce the disease. For example, if the bubo was a small, purulent one without bacilli in smears, while the spleen presented a nodule containing characteristic organisms, the latter organ was used. The following tabulations show the day of death of the guinea pigs inoculated directly from squirrels. For the sake of comparison figures are introduced showing the day of death of animals inoculated from cases of rat plague. All refer to vaccinated guinea pigs.

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[1] Journal of Infectious Diseases, Vol. VI, No. 5, November, 1909, pp. 676-686.

Length of life of animals inoculated with material from both squirrel and rat plague.

Day of death.	Squirrel plague—Federal laboratory.	Rat plague.		
		Bombay.[1]	San Francisco, Wherry, Walker & Howell.[2] [3]	San Francisco, Federal laboratory.
Second	....	3	....	....
Third	2	24	....	....
Fourth	15	23	....	6
Fifth	15	26	....	5
Sixth	22	18	....	4
Seventh	11	10	....	5
Eighth	7	2	....	....
Ninth	8	2	....	....
Tenth	2	2	....	....
Average duration of life........days..	6.0	4.8	4.9	5.4

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[1] Advisory committee appointed by the Secretary of State for India, The Royal Society, and the Lister Institute, Journal of Hygiene, Vol. VII, No. 3, 1907, p. 350.

[2] Time preceding death, 2 to 8 days.

[3] Wherry, Walker & Howell: Plague Among Rats in San Francisco, Journal American Medical Association, Vol. L, Apr. 11, 1908, pp. 1165–1167.

In the table we have avoided using figures where animals survived over 10 days. It will be seen that the guinea pigs vaccinated from cases of rat plague died on an average of about one day earlier than those vaccinated from cases of squirrel plague.

Length of life of animals inoculated with material from the several types of squirrel plague.

Day of death.	Guinea pigs vaccinated.			Guinea pigs inoculated subcutaneously.			White rats vaccinated.			White rats inoculated subcutaneously.		
	Acute cases.	Subacute cases.	Residual buboes.	Acute cases.	Subacute cases.	Residual buboes.	Acute cases.	Subacute cases.	Residual buboes.	Acute cases.	Subacute cases.	Residual buboes.
Second	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....
Third	.....	2	.....	1	6	.....	.....	1	.....	.....	2	1
Fourth	8	7	.....	.....	13	2	.....	4	.....	.....	2	.....
Fifth	2	10	3	4	19	7	.....	2	.....	.....	1	.....
Sixth	5	12	5	2	22	7	.....	.....	.....	.....	.....	1
Seventh	4	6	1	1	14	2	.....	.....	.....	.....	.....	.....
Eighth	2	4	1	.....	7	4	.....	.....	.....	.....	.....	.....
Ninth	1	7	.....	1	3	2	.....	.....	.....	.....	.....	.....
Tenth	1	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Eleventh	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Twelfth	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thirteenth	.....	2	.....	.....	2	1	.....	.....	.....	.....	.....	.....
Total animals used...	23	52	10	9	89	25	.....	7	.....	.....	6	2
Average duration of life..........days..	5.9	6.6	6	5.7	5.9	6.4	.....	4.1	.....	.....	3.5	4.5

A study of this table shows that there is practically no difference in the duration of life of guinea pigs inoculated from the various types of squirrel plague. In addition to the animals used in the above table it happened a few times that when guinea pigs were chloroformed on the fourteenth day they were found to be suffering from chronic plague.

SUSCEPTIBILITY OF MONKEYS TO INFECTION WITH THE BACILLUS FOUND IN GROUND SQUIRRELS.

Monkeys have usually been found to be quite susceptible to infection with plague. This refers to the strains derived from human cases and from rats. It seemed worth while determining the susceptibility of these animals to the cultures isolated from ground squirrels in California.

A monkey (Java) was vaccinated with a culture of *B. pestis* isolated about three months before directly from the heart's blood of a naturally infected squirrel. A guinea pig, a white rat, and a ground squirrel, all vaccinated, served as controls. The results are shown in the following table:

[Culture from squirrel 701, seventh generation on agar.]

Animals.	Day of death.	Lesions.
Monkey	Eighth	Acute plague.
White rat	Sixth	Do.
Guinea pig	Seventh.	Subacute plague.
Ground squirrel	do	Do.

A pure culture of *B. pestis* was isolated from the spleen of the monkey.

SUSCEPTIBILITY OF WHITE MICE.

We have not conducted any experiments for the express purpose of learning the susceptibility of white mice to the squirrel strain of *B. pestis*. However, a few of these rodents have been used in immunity investigations. Four were vaccinated with a culture of the squirrel plague bacillus. Three died of acute plague; the fourth remained well.

SUSCEPTIBILITY OF WHITE RABBITS.

Six of these animals were vaccinated with 48-hour agar cultures of *B. pestis*, a culture isolated from a different naturally infected squirrel being used for each. Guinea pigs and white rats served as controls. The results are shown in the following table:

Day of death.

Culture No.	White rabbit.	White rat.	Guinea pig.
245/3	Fourth; acute plague	Seventh; acute plague	Remained well.
665/2	Sixth; acute plague	Fourth; acute plague	Ninth; killed; small purulent bubo.
71/3	Ninth; killed; caseous bubo.	Seventh; acute plague	Fifth; acute plague.
361/3	Seventh; acute plague	Ninth; killed; negative	Remained well.
72/3	Sixth; acute plague	Fourth; acute plague	Do.
396/3	Fifth; acute plague	Ninth; killed; negative	Tenth; subacute plague.

Judged by the results of this experiment, the white rabbits would appear to be more susceptible to the cultures used than are either white rats or guinea pigs. We have no adequate explanation to offer for the irregular results obtained here.

SUSCEPTIBILITY OF DOGS, CATS, AND PIGEONS.

Cats and dogs.—In the first experiment three young cats were used. One was vaccinated with a 48-hour-old broth culture isolated from a natural-plague squirrel. This animal remained well and when chloroformed 22 days after the inoculation showed no lesions. Two were given 2 c. c. of the same culture, one receiving the injection subcutaneously and the other intraperitoneally. Both died on the fifth day. The one receiving the culture subcutaneously had a large gelatinous and purulent exudate over the front of the belly, a caseous bubo, and an enlarged spleen. The other presented at post-mortem a thin purulent peritoneal exudate which covered the liver and the spleen in the form of a rather sticky film. A pure culture of *B. pestis* was isolated from the liver and from the heart's blood of each cat. A guinea-pig control vaccinated with the same culture died on the fifth day with the usual lesions of acute plague.

Experiment No. 2.—Three cats were vaccinated with the liver of a guinea pig dead on the fifth day after inoculation from a naturally infected plague squirrel. One died on the fifth day, presenting at autopsy a small caseo-purulent bubo, an enlarged spleen, and considerable pericardial effusion. A pure culture of *B. pestis* was isolated from the heart's blood and from the spleen. The others were chloroformed on the eighth day. Neither presented any lesions.

Experiment No. 3.—Two small dogs and three small cats were inoculated subcutaneously, each with 0.5 c. c. of a 48-hour broth culture of *B. pestis* of squirrel origin. The dogs were chloroformed on the fifth day. Neither presented any abnormality beyond a small œdema at the site of the inoculation. One of the cats died on the third, one on the fourth, and the other on the fifth day. All presented lesions of plague. A pure culture of *B. pestis* was isolated from those dying on the fourth and fifth days. A guinea-pig control, inoculated subcutaneously with 0.1 c. c. of the culture, died of acute plague on the fourth day.

Pigeons.—But one experiment has been conducted with pigeons. Two were inoculated subcutaneously with 2 c. c. of a 3-day-old broth culture of the plague bacillus isolated from a squirrel. Neither appeared to suffer any ill effects from the injection and they did not present any lesions when chloroformed 18 days after inoculation.

The experiments with cats, dogs, and pigeons, although limited in number, give results similar to those observed when other strains (human and rat) of *B. pestis* are employed.

CROSS IMMUNIZATION EXPERIMENTS.

The subject of plague immunity is one too large to be discussed in this bulletin. Those who are interested in this are referred to Strong's [1] exhaustive review of the subject. We have been concerned especially in trying to determine by cross immunization experiments the relation of the bacillus found in plague in squirrels to that from other sources, and the relation to *B. pseudotuberculosis rodentium*, Pfeiffer.

Immunization by a strain of B. pestis of human origin.—We had in our possession a culture of the pest bacillus that had been isolated about 10 years ago from a human case in San Francisco. This culture was almost entirely avirulent. Two guinea pigs were immunized by inoculating them subcutaneously with living 4-day-old cultures of this organism. Following the injection, the animals were sick for a few days and developed a rather extensive brawny induration over the front of the belly. This swelling disappeared within a week. Twenty-four days after the immunizing injection, the rodents were vaccinated with a virulent culture of *B. pestis* of squirrel origin. Both remained well, and when chloroformed 12 days later, presented no lesions. Three guinea pigs were inoculated for controlling the virulence of the test dose. Two of these died of acute plague, one on the fourth and the other on the sixth day. The third control remained well, probably an example of natural immunity to plague in the guinea pig.

Immunization by a strain of B. pestis from India.—In this experiment the immunizing agent was an avirulent culture of *B. pestis*, the history of which is not known, except that it came originally from Bombay. A quantity of this culture, equivalent to about one-third of an agar slant growth, was used to immunize each guinea pig. Eighteen days later a test dose was given by vaccinating the animal with a 48-hour agar culture of virulent squirrel plague. The results are shown in the following table:

Guinea pig.	Day of death.	Lesions.
Immunized	Remained well	
Do	do	
Do	do	
Control	Seventh	Subacute plague.
Do	Fourth	Acute plague.
Do	Seventh	Subacute plague.

A glance at this table shows that the foreign avirulent strain of the pest bacillus immunizes very effectually against *B. pestis* of squirrel origin.

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[1] Philippine Journal of Science, Vol. II, No. 3, June, 1907.

Immunization by B. pseudotuberculosis rodentium, Pfeiffer.—As has been shown by several writers, the relation of this organism to *B. pestis* is in many respects a very close one. MacConkey [1] has reviewed the subject and added some experiments of his own. It is a most remarkable fact that this bacillus has the property of immunizing against *B. pestis.* One experiment of this nature is recorded here. Seven guinea pigs were inoculated with a live 48-hour-old broth culture of *B. pseudotuberculosis rodentium,* Pfeiffer, each being given 2 c. c. All of the animals were made sick for a few days, but soon regained their normal condition. Fifty-two days later, in order to test their immunity to the squirrel plague bacillus, they were vaccinated with a bubo from a guinea pig dead on the fifth day after vaccination from a naturally infected squirrel. One of the guinea pigs died; the remainder were chloroformed 70 days after the inoculation with plague. The results are shown in the following table:

Guinea pig.	Weight.	Lesions.	Remarks.
	Grams.		
No. 1	345	Large scar on belly; enlarged inguinal glands	
No. 2	235	Small purulent focus; left inguinal gland	
No. 3	190	None	
No. 4	170	do	
No. 5		do	
No. 6	540	Large scar on belly; enlarged inguinal gland	
No. 7	490	Had lesions of B. pseudotuberculosis rodentium. Cultures and smears negative, but a guinea pig inoculated subcutaneously with spleen was killed on seventeenth day and showed lesions of pseudotuberculosis rodentium.	Died fifty-first day after plague inoculation.
Control	350	Acute plague	Died sixth day.
Do	500	Subacute plague	Died eighth day.

In this experiment it will be seen that the previous inoculation very effectually immunized the guinea pigs against *B. pestis,* none of them showing any evidence of plague when examined, while the controls died of the disease.

A domestic strain of plague of human origin, a foreign strain, and *B. pseudotuberculosis rodentium,* Pfeiffer, all effectually immunized against the bacillus found in cases of plague in naturally infected ground squirrels.

SUMMARY.

The lesions of the various types of plague in ground squirrels, based upon the examination of 246 infected rodents, are described and the frequency of the several pathological changes stated. Especial attention is called to the predominance of the subacute type, and to the great variation in the lesions in the different cases.

Examination of stained smear preparations shows that in the majority of acute cases a probable diagnosis could be made by the micro-

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[1] Journal of Hygiene, Vol. VIII, No. 3, June, 1908, p. 335.

scopical examination, while in most of the subacute and chronic cases this could not be done.

The bacilli present in squirrel plague would appear to be somewhat less virulent for guinea pigs than those from cases of rat plague in America and India. Guinea pigs, rats, mice, and rabbits are highly susceptible to the infection, cats moderately so; dogs and pigeons are probably immune, but the data available is scanty.

Cross immunization experiments demonstrated that avirulent cultures of *B. pestis* of domestic and of foreign origin, as well as a culture of *B. pseudotuberculosis rodentium*, Pfeiffer, immunize against the plague bacillus of squirrel origin.

Part II.—NOTES ON INDUCED PLAGUE IN GROUND SQUIRRELS.

These observations are based upon the examination of about 150 ground squirrels that have been inoculated in the course of various experiments conducted at the Federal plague laboratory, San Francisco, Cal., and at the branch laboratory at Oakland, Cal.

THE LESIONS OF EXPERIMENTAL PLAGUE.

When a squirrel is inoculated with a virulent culture of the plague bacillus, the pathological changes produced by the reaction of the tissues depend upon the susceptibility of the animal and, probably to a less extent, upon the dose and virulence of the culture used. If the animal is highly susceptible, death occurs on the third, fourth, or fifth day, and the lesions of acute plague are found at the autopsy. The post-mortem findings differ somewhat from those of acute plague in rats and in guinea pigs, but are analogous to the lesions seen in fatal cases in man when death occurs early.

If the squirrel is somewhat resistant but not entirely immune, lesions similar to those of subacute plague in other animals are found. In cases in which the rodent has offered enough resistance to the infection to have progressed rather far on the road to recovery, we have in the majority of instances a condition which for the sake of convenience we call "residual buboes." These cases present purulent foci in or at the site of the peripheral lymph glands. They may be compared to the purulent buboes seen in cases of plague in man when recovery is taking place. It is occasionally difficult to determine under which of these heads the lesions found in an animal should be classed, but as a rule one can determine this point without much trouble. The length of time that has elapsed between the inoculation and the death of the animal is not always a reliable indication of the lesions that will be found. It sometimes happens that a squirrel dying on the fourth or fifth day exhibits pathological changes that are as far advanced as those ordinarily found when death occurs on the seventh or eighth day. The separation of the lesions into these classes follows in general the divisions long recognized in plague in other animals, but on account of the frequency in the squirrel of the purulent lymphatic gland as the only evidence of infection it seemed well to make a separate class of the residual buboes. The classification of the lesions as those of acute plague, subacute plague, and residual buboes has been found useful in the study of natural plague in squirrels. In over 400 naturally infected squirrels that have come under observation, we have seen duplicated all of the lesions that have been found in the experimentally infected animals.

ACUTE PLAGUE.

The term acute plague should be confined to the lesions that exist prior to the development of macroscopic necrotic foci in the internal organs. They are found when the animal dies between the third and the fifth or sixth day after infection. The post-mortem appearances are as follows:

Local reaction.—There is practically always an extensive lesion at the site of inoculation regardless of the mode of introducing the organism—that is to say, the reaction is present whether the infection is brought about by subcutaneous injection or by cutaneous inoculation (vaccination). The local reaction is generally in the form of a blood-stained slough surrounded by an elevated boundary of granulation tissue. The slough varies in size from 1 to 3 cm. in diameter or is even larger. When a section is made through one of these areas, it generally will be found that there is a hemorrhagic infiltration at the base and in the side walls of the lesion. At times the necrotic tissue has been detached and a deep ulcer is left. A rather extensive brawny thickening around the region of the slough is very common. The widespread gelatinous infiltration so commonly seen about the seat of inoculation in guinea pigs is not usually found in squirrels, though it occurs occasionally.

Occasionally the site of inoculation is marked by a rather firm nodule varying in size from a pea to the last joint of one's little finger. These nodules are somewhat caseous and are often hemorrhagic. In a few cases in which the animal dies on the third or fourth day, there may be no lesion beyond the reaction at the site of inoculation.

Subcutaneous injection.—This condition, so common in plague-infected rats, is rarely seen in squirrels.

The bubo.—One or more lymphatic glands will be found involved in practically all cases. The swelling caused by the enlarged lymph node can usually be detected before the region is incised. When an incision is made, the gland often will be found to be partially or completely surrounded by a bloody infiltration. A gelatinous exudate may or may not be present. In the majority of cases the gland is a little larger than a pea. The contents of the capsule is nearly always bloody and softened, and frequently, in addition to this, there is a more or less extensive purulent change. The pus may be present as a few mustard-seed-sized foci, or the whole of the gland may be converted into thick bloody pus. It may be said that in general the tendency to purulent change is much more marked than is the case in either guinea pigs or rats.

Occasionally only one gland is involved; more often, a larger number. It is not very unusual to have both axillary and both inguinal lymph nodes converted into buboes. When the inguinal glands are affected, those at the brim of the pelvis are almost invariably involved. It may not be amiss to call attention here to the fact that in the ground squirrel there is a lymph gland lying just above the pubis and very near to the median line. There is no corresponding structure in either rats or guinea pigs.

The spleen.—Occasionally the organ is very little changed, but as a rule it is found to be enlarged to several times the normal size, firm, and rather dry. The normal lilac color is replaced by a deep cherry red. Small hemorrhagic points are common.

The liver.—This organ is unchanged except perhaps for some engorgement and enlargement.

The lungs.—In this type of cases the lungs may be normal, but very frequently subpleural hemorrhages are found. These extravasations may be mere points, or they may be 0.5 to 1 cm. in diameter.

Hemorrhages.—Subcutaneous hemorrhages not directly connected with the bubo are seen occasionally. Subpleural hemorrhages have been mentioned. Extravasations are occasionally found under the peritoneum covering the intestines in the omentum, or in the mesentery. Subpericardial hemorrhages are rather common, as are petechiæ on the surfaces of the kidneys and of the suprarenals.

SUBACUTE PLAGUE.

When a squirrel dies about the sixth day or later, the lesions are usually quite different from those that have been described under the head of acute plague.

Reaction at site.—The site of inoculation often shows no reaction beyond a small brownish crust. In other cases, an ulcer marks the site of the slough that has been thrown off. Occasionally there is a marked brawny thickening. A small, firm papule is at times the only mark left to show where the organism was introduced. A small subcutaneous abscess is found in a few cases.

The bubo.—The bubo is generally purulent or caseous, with but little or no evidence of hemorrhage into the gland or surrounding it.

In some cases there is no lesion beyond a bubo, but in the majority the internal organs are involved. They may be described as follows:

The spleen.—This organ is enlarged and presents caseous or purulent foci varying in size from a pin point to a mustard seed and in number from two or three up to so many that the spleen somewhat resembles this organ in plague in the guinea pig. Sometimes caseous nodules as much as 1 cm. in diameter or larger are found. They may markedly distort the organ. In some cases the nodules seem to be in the process of organization.

The liver.—Granules and nodules similar to those found in the spleen are often encountered.

The lungs.—Granules and nodules like those found in the liver and in the spleen are often found. At times they are so numerous as to give the appearance of a fairly complete consolidation to the organ. The nodules are grayish red in color, and are surrounded by a well-defined deep-red zone. One remarkable example of complete consolidation of a lung has come under observation. In this case a squirrel was inoculated subcutaneously with a virulent culture of the pest bacillus. The animal died on the ninth day. At the post-mortem nothing was found at the site of inoculation beyond a small nodule. There was no bubo. The right lung, which was consolidated throughout, was grayish in color and showed the markings of the ribs on the pleural surface. The cut surface was firm, gray, and dry. There were two areas of softening in the consolidated organ, each one being about 1 cm. in diameter. Pleural exudate is rarely encountered. It may be serofibrinous, or fibrinous in character; the latter is always associated with gross lesions in the lungs.

RESIDUAL BUBOES.

It not infrequently happens that when a squirrel is killed two or three weeks or longer after inoculation, no lesions will be found beyond an enlarged lymph gland which contains yellow purulent foci, usually located just under the capsule. In other cases the site of the gland is marked by an abscess the size of a pea or larger. When these buboes are submitted to the inoculation test, they may or may not prove to contain virulent plague bacilli.

DISTRIBUTION OF BACILLI.

In practically all of the cases of acute plague there is a very heavy septicæmia, and organisms may be demonstrated in enormous numbers in the bubo, in the internal organs, and in the heart's blood. In the subacute cases, a septicæmia may or may not be present, but the bacilli are nearly always to be found in the bubo and in the lesions in the internal organs. In the cases where the only evidence of infection is a purulent bubo, with or without purulent foci in the internal organs, pest-like bacilli are rarely to be demonstrated in smears, although, as has been stated, some of these cases may be shown by the inoculation test to contain virulent bacilli.

SUMMARY.

The lesions of acute plague are an extensive necrosis at the site of inoculation, a hemorrhagic or caseous bubo, usually surrounded by a bloody exudate, and an enlarged spleen. Hemorrhages into the internal organs and into the subcutaneous tissue are common.

Subacute plague is indicated by the presence of a caseous or purulent bubo without much surrounding reaction. Granular or nodular lesions of the liver, spleen, and lungs may or may not be present.

Residual buboes are the result of an infection that is not sufficiently virulent to kill the animal.

DEVELOPMENT OF LESIONS.

This experiment was carried out at the suggestion of Passed Asst. Surg. W. C. Rucker, who thought that possibly certain early lesions of squirrel plague were overlooked by the laboratory assistants who dissected the rodents during the course of the investigation to determine the extent of squirrel plague in California.

Six squirrels were inoculated by the cutaneous method from the liver of a guinea pig dead on the fourth day after inoculation from a naturally infected squirrel. One was chloroformed after 30 hours and one every 24 hours thereafter. The object was to try to trace the development of the lesions. One of the squirrels died on the third day of plague, and one on the fourth day; consequently none were chloroformed on those days. The animal killed at the expiration of 30 hours showed nothing beyond a little dried serum at the site of inoculation, and would certainly have attracted no attention in the routine examination. It would perhaps be justifiable to speak of the disease as being in the stage of incubation. The squirrel killed on the next day (54 hours after inoculation) had a dried bloody scab at the site of inoculation; in addition, the spleen was enlarged. A few fine subpleural hemorrhages were present. There was no sign of a bubo. Unless the subpleural hemorrhages had attracted attention it is not at all likely that infection in this squirrel would have been detected during the routine examination. One of the squirrels died on the third day. It presented well-marked lesions—namely, a large bloody local reaction, hemorrhagic and caseating buboes, an enlarged spleen, and a blood-stained serous pleural effusion. This animal was pregnant, and the wall of the uterus was hemorrhagic, especially about the placental site. Another of the rodents died on the fourth day, and the lesions were similar to those found in the animal that had died on the preceding day, the only material difference being that the lesions were somewhat further advanced in caseation. The squirrel killed on the fifth day had large caseo-purulent buboes, and, in addition, the spleen was much enlarged and contained many fine whitish granules. The animal killed on the sixth day had caseopurulent buboes, but no other lesions.

In order to get a satisfactory picture of the progressive stages in the development of the various lesions, it would be necessary to inoculate a considerable number of rodents and kill several each day. In this way an average picture would probably be obtained.

SUMMARY.

The lesions of induced plague in the ground squirrel are not clearly distinguishable until the third day after inoculation. Distinct focal lesions may be found in the internal organs (spleen) as early as the fifth day.

INFLUENCE OF SIZE OF DOSE.

Two experiments have been performed for the purpose of ascertaining the influence of the size of the dose of culture injected.

The culture used in the first experiment was one that had been isolated about eight months before directly from the liver of a natural plague rat found in San Francisco. A 48-hour agar growth was used. The results are shown in the following table:

Dose of culture.	Day of death.	
	Guinea pig.	Squirrel.
0.0001 loop	Fourth	Fourth.[1]
0.00001 loop	Sixth	Sixth.
0.000001 loop	Eighth	Eighth.

[1] Intraperitoneally.

The results would apparently indicate that the size of the dose had some influence upon the length of time the animal survived after the inoculation. I am inclined to believe, however, that no such inference should be drawn from it. The squirrel that received one ten-thousandth part of a loop was inadvertently inoculated intraperitoneally instead of subcutaneously, and it is a well-known fact that intraperitoneal inoculation of *B. pestis* leads to a fatal result much earlier than when a culture is injected subcutaneously.

So far as the guinea pigs are concerned, other and more extensive experiments do not lend any support to the view that the variations in dose in this case made any material difference. The loop used took up approximately 266,000,000 bacilli from an agar culture; therefore about 266 bacilli was the smallest number injected. It is needless to remark that large errors are possible in the making of suspensions of the plague bacillus.

In the following table the experiment was originally designed to determine the influence of the size of the dose upon the relative immunity of certain squirrels, but it seems to show that in susceptible animals the size of the dose has no material influence.

In this experiment a 48-hour broth culture of squirrel origin was used.

Dose of broth culture.	Weight of squirrel.	Day of death.	Dose of broth culture.	Weight of squirrel.	Day of death.
c. c.	*Gms.*		*c. c.*	*Gms.*	
0.01	560	Fifth.	0.00001	540	Twenty-sixth; killed; no lesions.
.01	420	Seventh.	.000001	360	Fifth.
.0001	360	Do.	.000001	510	Seventh.
.0001	640	Eighth.			
.00001	350	Fifth.			

It will be seen that the size of dose within the limits used had no influence upon the results. By a coincidence it happened that the two animals receiving the smallest dose lived just the same length of time as those receiving the largest dose. One of the squirrels used in this experiment was immune.

SUMMARY.

Considerable variations in the dose of culture used have no influence upon the length of time required to kill susceptible squirrels.

SOURCE OF CULTURES.

When the next experiment was performed we had at our disposal four cultures of the pest bacillus, two of which came from plague squirrels and two from human cases of plague that were of squirrel origin. One squirrel culture and one of the human cultures were isolated from infections at Los Angeles, Cal., and the others from cases occurring in Contra Costa County, Cal.

In each case a 48-hour agar culture was used to vaccinate the animal. The cultures had all been isolated directly from the naturally infected animals with the exception of the Los Angeles squirrel, which had been passed through a guinea pig in the process of isolation. These are shown by name in the table:

[Figures after name of culture indicate generation on artificial media.]

Source of culture.	Day of death.	
	Guinea pigs.	Squirrels.
Los Angeles, Cal.:		
Human (5)	Fourth	Fourth.
Squirrel (5)	do.	Sixth.
Contra Costa County, Cal.:		
Human (3)	Fifth	Fifth.
Squirrel (4)	Fourth	Twelfth; killed; subacute plague.

SUMMARY.

The table indicates nothing more than that one of the squirrels used was more resistant than its fellows, and that cultures from plague cases (squirrel and human) in the southern part of the State (Los Angeles) where the infection was recent were as virulent as those from the northern part of the State (Contra Costa) where the disease had been present several years.

VIRULENCE OF BACILLUS PESTIS AFTER EXPERIMENTAL PASSAGE THROUGH GROUND SQUIRRELS.

These experiments were undertaken for the purpose of ascertaining whether there was any alteration in the virulence of the pest bacillus after passage through a series of ground squirrels. The question was of some practical importance, as it seemed probable that if any marked attenuation occurred the existence of plague among the ground squirrels of California assumed a different aspect from a public-health point of view than if full virulence was maintained. It has been claimed by some observers that passage of the pest bacillus through a series of rats leads to a reduction in virulence. Work along this line with the wild rats of San Francisco was complicated by the presence of a large percentage of immunity[1] to plague infection. I may say, however, that we have successfully carried the infection through five generations in wild San Francisco rats without apparent loss of virulence.

Technique.—Each series of squirrels was started with a pure culture of *B. pestis*, the origin of which is noted. When a squirrel died, the spleen or liver was used to inoculate another squirrel, and so on, until the end of the series. In nearly every case a guinea pig and two or more wild rats were inoculated in the same manner from the same material. The object of using the guinea pigs and wild rats was twofold: First, they served as controls for the virulence of the bacilli used to infect the squirrel; and second, we were able to learn if any change in virulence for these animals (guinea pigs and wild rats) was caused by the passage of the organism through the squirrels. The latter question is one of considerable importance, because if it should happen that passage through squirrels reduces the virulence of the organism for rats, squirrel plague would be of much less importance than if the organism remained fully virulent for rats. It is obvious that under natural conditions the strain of plague among squirrels must have passed through many more generations than we have found it practicable to carry it through experimentally.

The culture used for the first series was derived from a natural plague rat, taken in San Francisco, on July 28, 1908. The spleen of this rat was used to vaccinate a guinea pig. This guinea pig died on the sixth day after inoculation and a pure culture of *B. pestis* was isolated from its liver. The third generation of this culture on an artificial medium (agar) was used to inoculate a squirrel and a guinea pig.

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[1] Journal of Infectious Diseases, Vol. VI, No. 3, pp. 289–295, June 12, 1909.

The table shows the progress of the experiment. In every case all of the rodents (squirrels, guinea pigs, and rats) of any number were inoculated (vaccinated) from the squirrel of the preceding number. The inoculations were all made by shaving the skin of the belly so closely as to abrade the epithelium and leave a raw surface into which the culture or tissue was rubbed. The figures show the day of death of the various rodents.

SERIES NO. 1.

No.	Day of death.				
	Squirrel.	Guinea pig.	Rat No. 1.	Rat No. 2.	Rat No. 3.
1	Sixth	Sixth			
2	Fourth	Fourth	Fourth	Fourth	
3	Third	Sixth	Seventh	do	Sixth.
4	Fifth	Third	Third	Tenth; killed; no lesions.	Do.
5	Sixth	Fifth	Nineteenth; killed; no lesions.	Tenth; chronic plague.	
6	Fourth	do	Thirteenth; killed; no lesions.	Sixth	
7	do	Sixth	Twelfth; killed; no lesions.	Twelfth; killed; chronic plague.	
8	Fifth	Seventh	Tenth; killed; no lesions.	Eighth	
9	Third	do	Twenty-third; killed; no lesions.	Twenty-third; killed; no lesions.	
10	Fifth	Fifth	Seventeenth; killed; no lesions.	Fourth	
11	Fourth	do	Fifth	Seventh	Fifth.
12	do	Third; had early plague, also pneumonia.	Seventh	Fourth	Tenth; killed; chronic plague.
13	do	Third	Fifth	Fifth	Fifth.
14	Fifth	Fifth	Seventeenth; killed; no lesions.	do	Do.
15	do	do	Fourth	Seventh	Seventh.
16	Sixth	Seventh	do	Fourth	Fourth.
17	Fourth	Sixth	Eighth	Third	Do.
18	do	Eighth	Fifth	Fourth	Do.
19	Sixth	Fifth	Sixth	Seventh	Ninth.
20	Third	Fourth	Fourteenth; killed; no lesions.	Fourteenth; killed; chronic plague.	Sixth.
21	Fifth	Third	Fifth	Second	Fourth.
22	Sixth	Fourth	Fourth	Thirteenth; killed; no lesions.	Thirteenth; killed; no lesions.
23	do	Fifth	Sixth	Sixth	
24	Third	Fourth	Fourth	Ninth; killed; no lesions.	Ninth; killed; no lesions.
25	Seventh	Sixth	do		
26	Sixth	Seventh	do	Twelfth; killed; chronic plague.	Fifth.
27	Fourth	Fourth; killed; no lesions.	Eleventh; killed; no lesions.	Eleventh; killed; no lesions.	
28	do	Fourth	Thirteenth; killed; no lesions.	Fifth	Fourth.

Average duration of life of squirrels, 4.7 days.

A guinea pig was inoculated from the last squirrel (No. 28). It died in four days of acute plague. The experiment was begun November 28, 1908, and terminated April 10, 1909.

The second series was started with a culture of the plague bacillus isolated directly from the lung of the first natural plague squirrel found in California. It had never been passed through a laboratory animal. The third generation (24 hours old) on agar was used to start the experiment. The chain was maintained as was the first by inoculation (vaccination) from the spleen or liver of the squirrels. The culture was originally isolated on August 6, 1908, and the series was begun on February 5, 1909; therefore, the culture had been isolated about six months prior to the beginning of this work.

SERIES NO. 2.

No.	Day of death.				
	Squirrel.	Guinea pig.	Rat No. 1.	Rat No. 2.	Rat No. 3.
1	Sixth	Eighth			
2	Fourth	Fifth	Thirteenth; killed; chronic plague.	Fourth	Sixth.
3	Fifth	None used	Twelfth; killed; no lesions.	Fifth	Do.
4	Seventh	Fifth	Fourth	do	Fifth.
5	Third	Sixth	Eleventh; killed; no lesions.	Eleventh; killed; no lesions.	Eleventh; killed; no lesions.
6[1]	Fourteenth; killed; no lesions.	Ninth	Sixth	Seventh	Sixth.
7	Sixth	None used	Fifth	Sixth	Seventh.
8	Fourth	Fourth	Fourth		
9	Seventh	do	do	Fourth	Fifth.
10	do	None used	Fifth	Fifth	Fourteenth; killed; chronic plague.
11	do	Fourth	Seventeenth; killed; no lesions.	Fourth	Sixth.
12	do	None used	Tenth; killed; no lesions.	Fifth	
13	Fifth	Third; beginning plague, died of pneumonia.	Fourteenth; killed; no lesions.	Fourth	

[1] Probably immune.

Average duration of life of squirrels, 5.25 days.

The second series was interrupted by encountering an immune squirrel (No. 6). It was, however, carried forward by giving the chain a fresh start, using a culture derived from squirrel No. 4.

On one or two occasions in each series the squirrel died within 24 or 48 hours after the inoculation, and presumably not from plague. When this happened another squirrel was inoculated from the spleen (which had been preserved on ice) of the preceding number in the chain.

A glance at the tables will show that there was no alteration in the virulence of the infecting organism for either squirrels, guinea pigs, or rats (*Mus norvegicus*).

Such variations in the time of death as occurred were probably due to varying susceptibility of the animals. As was to be anticipated, a large percentage of the rats proved immune. This agrees with the results of extensive experiments made to determine this point.[1]

SUMMARY.

Passage of the *B. pestis* through a series of 28 squirrels led to no alteration in virulence for squirrels, guinea pigs, or wild rats.

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[1] Journal of Infectious Diseases, Vol. VI, No. 3, June 12, 1909, pp. 289-295.

Part III.—IMMUNITY OF CERTAIN SQUIRRELS TO PLAGUE INFECTION.

During the first year that the writer worked with experimentally infected ground squirrels, all of the rodents used were caught either in the city of San Francisco or in San Mateo County. This county, as well as the city of San Francisco, is located on the peninsula of San Francisco, and, so far as is known, the squirrels in this section have never had plague among them. Several hundred have been killed and examined, but no infection has been found. Inoculation showed that these squirrels were highly susceptible to plague, as failure to succumb to the infection was very rare. It seemed desirable to determine whether squirrels from the zone of squirrel plague in Contra Costa County, which is on the mainland, were equally susceptible. The squirrels from the two counties are of the same species. A number of those that were used in the following experiments were submitted to Prof. Joseph Grinnell, of the department of mammalogy of the University of California, for classification, and he pronounced those from the two counties to be identical.

The squirrels from Contra Costa County were caught at various points within the area known to be infected. In each experiment several squirrels from each county were inoculated with the same culture, in the same manner, and so far as practicable with the same dose. Before being used all of the animals were kept in stock long enough to exclude natural plague. In several of the experiments guinea pigs and white rats were used as "controls."

Experiment No. 1.

In this experiment the animals were all inoculated by the cutaneous (vaccination) method, with one loopful of a suspension in broth of a 24-hour-old agar culture of *B. pestis*. This culture had been isolated directly from the heart's blood of a naturally infected ground squirrel about three months before the present experiment was carried out. The fourth generation on agar was used.

Animals.	Weight. *Grams.*	Day of death.
Guinea pig (control)	400	Sixth; acute plague.[1]
White rat (control)		Fifth; acute plague.
San Mateo squirrel	445	Do.[1]
Do	600	Do.[1]
Contra Costa squirrel	360	Ninth; subacute plague.
Do	Small.	Tenth; subacute plague.[1]
Do	360	Fourteenth; killed; residual bubo.[2]
Do	467	Do.

[1] Culture of *B. pestis* isolated from animal.
[2] Purulent lymph gland resulting from plague infection.

Judged by its effect on the guinea pig and on the white rat, it will be seen that the culture was fairly virulent. The two San Mateo County squirrels died early with the lesions of acute plague, while of the four Contra Costa squirrels two died of subacute plague and two had abscesses in the region of the lymph glands.

Attention is called to the fact that the squirrels which proved resistant averaged considerably less in weight than those that succumbed.

Experiment No. 2.

In this experiment the culture was one that had been isolated directly from a plague rat about 14 months before this work was undertaken. One loopful of a 48-hour agar culture was used to vaccinate each of the animals. The results are as follows:

Animals.	Weight.	Day of death.
	Grams.	
Guinea pig (control)	365	Ninth; subacute plague.
San Mateo ground squirrel	433	Fourth; acute plague.
Do	542	Seventh; subacute plague.
Contra Costa ground squirrel	361	Third; acute plague.[1]
Do	210	Second; no lesions.

[1] Culture of *B. pestis* isolated from animal.

This experiment is reported here merely for the purpose of recording all in the series, although it complicates rather than aids in solving the problem we are dealing with. That the culture was probably of low virulence is shown by the fact that the guinea pig died on the ninth day. One of the Contra Costa squirrels died about 48 hours after the inoculation, but the cause of death could not be ascertained. The other Contra Costa squirrel died on the third day with the usual lesions of acute plague.

Experiment No. 3.

In this experiment the spleen of a guinea pig that had died of acute plague on the fifth day after inoculation with tissue from a naturally infected ground squirrel was used to vaccinate each of the animals mentioned in the following table. On account of a shortage of guinea pigs no control was inoculated.

Animals.	Weight.	Day of death.
	Grams.	
San Mateo squirrel	545	Sixth; acute plague.[1]
Do	445	Eleventh; subacute plague.[1]
Contra Costa squirrel	500	Eighteenth; killed; residual bubo.[2]
Do	442	Do.

[1] Culture of *B. pestis* isolated from animal.
[2] Purulent lymph gland resulting from plague infection.

The Contra Costa squirrels were apparently in good health when they were chloroformed, although at the post-mortem examination one of them showed an old lesion of plague.

Experiment No. 4.

The same culture was used as in experiment No. 2, but the eleventh generation was used instead of the sixth. One loopful of a broth suspension of a 24-hour agar growth was used to vaccinate the animals.

Animals.	Weight.	Day of death.
	Grams.	
Guinea pig (control)	325	Sixth; acute plague.
San Mateo squirrel	630	Seventh; subacute plague.[1]
Do	650	Fourteenth; killed; no lesions.
Contra Costa squirrel	360	Do.
Do	320	Do.

[1] Culture of *B. pestis* isolated from animal.

Here, for the first time in the series, we encountered an immune San Mateo squirrel; both of the Contra Costa squirrels were immune to the culture used.

Experiment No. 5.

The preceding experiments were conducted with strains of the plague bacillus that had been isolated in California. It seemed wise to test a series of animals using a strain from a different source. Therefore, in the present experiment, the animals were all inoculated by the subcutaneous method with a broth suspension of a plague culture from the stock of the Hygienic Laboratory, Washington, D. C. This culture is known as "Jedda," and has been carried for several years upon artificial media. Each of the animals was given subcutaneously 0.5 c. c. of a suspension of a 48-hour agar culture.

The results, which are very similar to those obtained with what might be called native strains of the plague bacillus, are shown in the following table:

Animals.	Weight.	Day of death.
	Grams.	
Guinea pig (control)	380	Sixth; acute plague.
White rat (control)	....	Fourth; acute plague.
San Mateo squirrel	510	Do.[1]
Do	380	Seventh; subacute plague.[1]
Do	635	Ninth; subacute plague.
Contra Costa squirrel	780	Seventh; subacute plague.
Do	700	Eighteenth; killed; no lesions.
Do	560	Do.

[1] Culture of *B. pestis* isolated from animal.

In this case the dose of culture was very large, but in spite of this fact only one of the Contra Costa County squirrels died, while all of those from San Mateo County succumbed to the infection.

Experiment No. 6.

This experiment was designed to show the influence of the dose of culture on the immunity of the Contra Costa rodents as well as to compare their susceptibility with that of squirrels from outside the plague zone. Instead of using animals from San Mateo County, as had been done in the previous experiments, we used those from other counties (Tulare, Ventura) which have never furnished plague infection, although it has been carefully searched for. The culture used was a 48-hour broth growth planted from an agar culture that had been isolated a few months before from a naturally infected squirrel.

	0.01 c. c. culture.		0.0001 c. c. culture.	
	Weight.	Day of death.	Weight.	Day of death.
	Grams.		*Grams.*	
White rat	115	Third	135	Twenty-sixth; killed; negative.
Guinea pig	360	Seventh	....	Eighth.
Do	400	do	410	Do.
Contra Costa squirrel	365	Thirteenth; killed; negative.	535	Seventeenth; killed; negative.
Tulare squirrel	560	Fifth	360	Seventh.
Ventura squirrel	420	Seventh	640	Eighth.

	0.00001 c. c. culture.		0.000001 c. c. culture.	
	Weight.	Day of death.	Weight.	Day of death.
	Grams.		*Grams.*	
White rat	110	Twenty-sixth; killed; negative.	170	Twenty-sixth; killed; negative.
Guinea pig	475	Thirty-fifth; killed; negative.	440	Seventh.
Do	390	Thirteenth	420	Thirteenth.
Contra Costa squirrel	700	Seventeenth; killed; negative.	550	Seventeenth; killed; negative.
Tulare squirrel	350	Fifth	360	Fifth.
Ventura squirrel	540	Twenty-sixth; killed; negative.	510	Seventh.

Here all of the Contra Costa squirrels survived while all but one of those from the other counties perished. But one of the white rats died. We have noted that the squirrel plague bacillus is sometimes only slightly virulent for white rats.

In order to determine approximately the number of bacilli in each dose, agar plates were made from each dilution and the number of colonies counted after 72 hours at 37° C. The results were: 0.01 c.c., innumerable; 0.0001 c.c., innumerable; 0.00001 c.c., 430 colonies; 0.000001 c.c., 42 colonies.

The cultures were made after vigorous shaking of the suspensions which were made in 0.8 per cent sodium chloride solution. It is not believed that the number of colonies that appeared indicates more than approximately the number of bacilli in the smaller doses.

DISCUSSION.

When we come to consider the significance of the results of these inoculations, we are confronted at once by the question as to whether the apparent immunity of the Contra Costa rodents may not have been merely a matter of accident. It is quite true that in experiment No. 2 the San Mateo squirrels lived longer than those from Contra Costa County, but on the other hand, in all of the other experiments, the majority of the Contra Costa squirrels outlived the San Mateo squirrels very materially. In fact, many of them were found entirely normal when chloroformed. It seems hardly likely that a coincidence should account for the fact. The results shown in the various tables may be conveniently summarized as follows:

	Total used.	Died.		Killed.	
		Acute plague.	Subacute plague.	Residual bubo.	No. lesions.
Contra Costa squirrels	16	1	3	3	9
San Mateo squirrels and others from plague-free zone	19	8	9	....	2

Assuming that the Contra Costa squirrels are less susceptible to laboratory infection than are the San Mateo squirrels, we may for a moment consider what influence might account for this difference in susceptibility.

In the present case, the known fact that the squirrels in the one county (Contra Costa) have been exposed to plague infection for several years must be regarded as the cause of the relative immunity of the squirrels from that locality. This condition of increased resistance may have been brought about either by an acquired and possibly hereditarily transmitted immunity, or by the survival of animals that were naturally immune, and the descendants of such animals. At present we have no evidence bearing upon this point. It is not improbable that both factors play a part. It might be considered that the presence of the immunity was an indication of the dying out of the epizootic among the rodents of the infected county, but as we still find a large number of infected squirrels there, not much support is lent to this view.

We have suggested that this relative immunity of certain squirrels be put to practical use by regarding it as an index to the presence of plague infection among these rodents even before actually infected animals have been found. The importance of this will be understood when it is explained that in the case of one county over 4,000 squirrels were examined before finding an infected animal. Now, if it can be shown that the squirrels from any county are highly resistant to the infection, as is the case with those from Contra Costa County, we would have fairly strong evidence that the rodents of that county had been the subject of an epizootic of plague. It is evident that the reverse is not necessarily true as highly susceptible squirrels might be present in part of a county if the infection had not reached the particular locality from which they were taken.

SUMMARY.

These experiments indicate that healthy squirrels from localities where the epizootic has prevailed for several years are decidedly more resistant to artificial infection with *B. pestis* than those from localities in which plague has not appeared among the squirrels.

Part IV.—INSECT TRANSMISSION IN RELATION TO PLAGUE AMONG GROUND SQUIRRELS.

PLAGUE BACILLI IN ECTO-PARASITES OF GROUND SQUIRRELS.

Several observers[1] have demonstrated the presence of *B. pestis* in ecto-parasites of man and of rats; therefore, it seemed desirable to determine the facts in regard to insects from the Sciuridæ.

The flea used in our work was *Ceratophyllus acutus*, Baker, the one most commonly found upon ground squirrels in California. The louse was *Hæmatopinus columbianus*, Osborn. For the identification of the lice I am indebted to Dr. L. O. Howard and Prof. Nathan Banks of the Bureau of Entomology, Department of Agriculture, Washington, D. C.

The evidence of the presence of *B. pestis* in the ecto-parasites under consideration rests upon two kinds of observations.

1. The examination of stained smear preparations made by crushing the parasite (louse or flea) and staining the films: The presence in such preparations of pest-like organisms of course would afford only presumptive evidence as to the nature of the infection. Previous workers[2] have noted that bacteria resembling *B. pestis* were not found in the stomachs of rat fleas other than those that carried pest bacilli. Our own observations made by crushing squirrel fleas give similar results. We have examined stained smear preparations from a large number of fleas taken from healthy squirrels, but have never encountered any organism that bore a close resemblance to *B. pestis*. In fact, they were generally free or almost free from bacteria of any sort. The only example we have of finding organisms in any number in crushed fleas other than those from plague animals was the following: A laboratory attendant captured a flea in the act of biting him on the forearm. The parasite which was identified as a *Ceratophyllus acutus* was crushed between slides. The stained smear showed a large number of organisms, some of which morphologically were quite like *B. pestis*. As we were working with plague-infected fleas and

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[1] The reader is referred to Journal of Hygiene, Vol. VI, No. 4, 1906, p. 425, for a review of the subject, as well as for many experiments on insect transmission of plague.

[2] The advisory committee appointed by the Secretary of State for India, the Royal Society, and the Lister Institute, Journal of Hygiene, Vol. VII, No. 3, 1907, p. 398.

plague-infected squirrels, a searching inquiry was undertaken to ascertain the origin of the flea that bit this man. It was found that the only squirrel that he had handled on the day in question was one found dead in the stock cage. This rodent had a broken leg which was suppurating. Smears from the internal organs showed many bacteria, a few of which slightly resembled *B. pestis*. The animal showed none of the gross lesions of plague and bacteriological investigation confirmed the absence of the plague bacillus. At the time we examined the rodent no fleas were found on its body, but a number of lice were secured, crushed, and examined. The smears from these showed bacteria resembling those found in the flea that had bitten the man. While the evidence that the parasite found on the man had actually come from this squirrel is not conclusive, it is very probable that this was its origin.

In our experience lice taken from a healthy squirrel, even when kept several days before being crushed and stained, showed no organisms that would likely be mistaken for the plague bacillus.

2. The inoculation of a laboratory animal with feces from an insect, or with a part of the parasite's body: If the inoculated animal dies of plague, the evidence is conclusive that the pest bacillus was present in the feces or in the insect's body. It should be stated here that all of our work had been done with parasites derived from experimentally infected rodents.

The experiments of several workers [1] have shown that the feces of rat fleas are infected with plague bacilli, and our observations show that this is true for feces of squirrel fleas. Our work in this connection consisted of inoculation experiments alone; no microscopical examinations were made.

TECHNIQUE.

The following procedure was used: The flea or louse was crushed between two glass slides which were then separated. The one carrying the smaller film was stained and examined for pest-like bacilli, a note being made of the findings. The remnant of the insect on the other slide was gently removed with a small pledget of absorbent cotton moistened with normal salt solution and introduced into a pocket under the skin of a guinea pig.

When the fecal deposit was used for inoculation it was emulsified in a small volume of the saline solution and the suspension injected subcutaneously. The flea was transferred to a sterile test tube every day or two so as to separate the feces passed on different days.

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[1] Journal of Hygiene, Vol. VI, No. 4, 1906, p. 425.

Plague bacilli in fleas.—In the following table is shown the results of the subcutaneous inoculation of guinea pigs with two squirrel fleas taken from a gray rat and three taken from a ground squirrel:

Flea No.	Sex of flea.	Species of flea.	Host.	Day of death of guinea pig.	Lesions in guinea pig inoculated with crushed flea.	B. pestis recovered from guinea pig.
1	Female	C. acutus	M. norvegicus	Sixth	Acute plague	Yes.
2	Male	do	do	do	do	Yes.
3	(?)	do	C. beecheyi	Eighth	Subacute plague	Yes.
4	Female	do	do	Eleventh	do	No.
5	do	do	do	Eighth	do	Yes.

Fleas 3, 4, and 5 had been removed from the host (squirrel) three days prior to the inoculation. Those from the rats, Nos. 1 and 2, were used immediately after removal from the rodent. In each case the stained film from the crushed insect showed a few pestlike organisms.

Plague bacilli in flea feces.—A squirrel flea (female *C. acutus*) taken from a plague squirrel was placed in a sterile test tube where during the ensuing few hours feces were deposited. A guinea pig inoculated with this material died on the sixth day and presented at autopsy the usual lesions of plague. A pure culture of *B. pestis* was isolated from the liver.

The following experiments were undertaken for the purpose of ascertaining if possible how long the feces of fleas remain infective. The insects were removed from a plague-infected squirrel soon after its death. The smears from the heart's blood of the rodent showed a heavy septicæmia. Feces passed by the fleas during various periods after removal from the host were used to inoculate guinea pigs.

Feces passed in 24 and 48 hour periods.

Flea No.	Guinea pig inoculated with feces passed in—			
	First 24 hours.	Second 24 hours.	Third and fourth 24 hours.	Fifth and sixth 24 hours.
1	Negative	Negative	Negative	Negative.
2	Death, ninth day; plague.	Death, eighth day; plague.	do	Do.
3	Negative	No feces	do	No feces.
4	Death, eighth day; plague.	do	do	Do.
5	Negative	Negative	do	Negative.

At the beginning of the above experiment two of the five fleas harbored the plague bacillus. After the second 24 hours all inoculations resulted negatively. The parasites were not fed during the period of observation.

Feces from fleas taken from another plague squirrel were collected at 24-hour intervals and used to inoculate guinea pigs. The results were as follows:

Flea No.	Guinea pig inoculated with feces passed in—			
	First 24 hours.	Second 24 hours.	Third 24 hours.	Fourth 24 hours.
1	No feces	Death, seventh day; plague.	No feces	No feces.
2	do	Death, eighth day; plague.	Death, fourth day; plague.	Death, tenth day; plague.
3	do	No feces	No feces	Death, eighth day; plague.

Two of the fleas harbored plague bacilli as late as the fourth day after removal from the host.

In both of these experiments the fleas were kept at room temperature.

Plague bacilli in lice.—A squirrel died of acute plague on the third day after inoculation. When examined a few hours after death, smears from the heart's blood showed a large number of characteristic bacilli. Six lice were removed from this animal; four were crushed at once, and all showed large numbers of characteristic pest-like bacilli. The remaining portion of each louse was inoculated into a guinea pig or a squirrel, with the following result:

Louse No.	Inoculated into—	Result.
1	Guinea pig	Died of acute plague on fourth day.
2	do	Died of acute plague on fifth day.
3	Ground squirrel	Died of acute plague on third day.
4	do	Died of acute plague on fifth day.

In every case the animals showed characteristic lesions of plague, and a pure culture of *B. pestis* was isolated, except from the guinea pig inoculated from louse No. 1.

Two of the lice were kept at room temperature until the fourth day, when one was found dead. Both were crushed and found to contain large numbers of pest-like bacilli. Parts of these lice were used to inoculate guinea pigs in the usual way (by the aid of a pledget of cotton), with the following result: Guinea pig inoculated from louse found dead, died of plague on the sixth day; that inoculated from louse killed, died of plague on the fifth day.

The following experiment indicates that a very large percentage of the lice harbor plague bacilli: Nineteen other lice from the same squirrel that furnished the insects in the preceding experiment were examined microscopically for pest-like bacilli four days after their removal from the host. Of 4 males, 2 showed such organisms and 2 were negative; of 15 females, all but 1 were positive.

A squirrel died of acute plague on the sixth day after inoculation. Twenty-nine lice were removed from this animal. Twenty-five of them were crushed and stained 24 hours after the removal from the host. Of this number, 20 showed pest-like bacilli, while 5 were negative. The remaining 4, which were put aside at room temperature, were found dead on the fourth day after their removal from the squirrel. These were used for inoculation experiments on guinea pigs. The rodents died of plague on the fifth, sixth, seventh, and tenth days, respectively, and a pure culture of *B. pestis* was isolated from each, with the exception of the one dead on the tenth day.

In another case a number of lice were taken from a squirrel which had died 4 days after inoculation; 17 were examined microscopically; 15 of them contained pest-like bacilli, while 2 showed no suspicious organisms. In this case a guinea pig inoculated from one of the crushed lice which showed bacilli died of acute plague.

The lice used for a series of inoculations to determine how long the parasites harbored virulent plague bacilli were removed from a squirrel dead of acute plague 6 days after infection. A smear from the heart's blood of this animal showed a large number of pest-like bacilli. Only those lice were used that showed characteristic organisms in stained preparations. Some of the lice examined on and after the sixth day showed objects which were interpreted as involution forms of the organism, similar to those found in salt agar growths. Indeed, the smears from some on the eighth and on the fourteenth days were noted as showing almost nothing but these forms; that is, practically no bipolar organisms were present.

The majority of the lice used were found dead upon the day of inoculation. All were kept at room temperature.

The results were as follows:

Time after removal of louse from host.	Louse killed or found dead.	Day of death of guinea pig inoculated with louse.	Lesions.
4 days	Killed	Eighth	Subacute plague.
Do	Found dead	Fifth	Acute plague.
6 days	Killed	Eighth	Subacute plague.
Do	Found dead	Fourth	Acute plague.
8 days	Killed	Fourteenth; killed	None.
Do	Found dead	Sixth	Acute plague.
11 days	do	Fifth	Do.
Do	do	Eleventh; killed	None.
14 days	do	Sixth	Acute plague.
Do	do	Fifth	Do.
19 days	do	Sixth	Do.
Do	do	Twentieth; killed	None.

NOTE.—The lice found dead may have died at any time subsequent to the last previous inoculation, as the containers were not examined in the interval.

Those lice used 19 days after removal from the host died after the fourteenth day; therefore this experiment demonstrates that lice from squirrels may harbor virulent plague bacilli for at least 2 weeks.

UNSUCCESSFUL ATTEMPTS AT INSECT TRANSMISSION.

On two occasions we have tried to transmit plague by removing a few fleas from a septicæmic squirrel and permitting them to feed upon a healthy one. The result was negative both times. The fleas were confined in a test tube and allowed to feed through the meshes of cheesecloth that covered the open end. This method had been used successfully by the workers in India [1] in experiments on rats and on guinea pigs. We may remark here that it is not especially difficult for a flea to escape through the meshes of the cheese cloth, and in our experiments this happened once or twice, but the insect was always recaptured.

We have made three attempts to transmit plague from one squirrel to another by putting lice from a plague animal showing septicæmia on a healthy one. In one case, 6 lice were used; in another, 11; and in the third experiment 44 were applied. The lice were placed among the hairs and near the skin. The result was negative in each case. In every instance control lice from the infected squirrel were crushed, and the resulting smears showed pest-like organisms. The parts of the controls used for inoculating guinea pigs caused plague in the rodents.

The conditions in such experiments are so highly artificial that the result of these attempts can hardly be accepted as negativing the possibility that lice may transmit plague infection.

FLEA TRANSMISSION.

The California ground squirrel almost always harbors a large number of fleas. The two species most commonly found are *Ceratophyllus acutus*, Baker, which has been used in all of our transmission work (except one experiment where rat fleas, *C. fasciatus*, were used), and *Hoplopsyllus anomalus*, Baker. The former is found much more frequently and usually in larger numbers. These experiments have been conducted in much the same manner as those by the earlier workers who have investigated the subject of flea transmission of plague. A rodent was inoculated with a virulent culture of the plague bacillus, or with tissue from an animal recently dead of the disease. Except in two cases, the strain used was of squirrel origin. Fleas were placed in the cage either at the time the rodent was infected, or after it sickened. After death, one or more healthy animals were placed in the cage with it, or fleas were picked from the dead rodent and placed in a clean cage with one or more healthy animals.

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[1] Journal of Hygiene, Vol. VII, No. 3, 1907, p. 382.

In most of our experiments the cage used was an ordinary galvanized iron garbage can, 33 inches high by 19 inches in diameter. About 6 inches from the top a diaphragm made of ½-inch mesh galvanized-iron wire screening was set on four angle irons. When an infected squirrel or rat was placed in the cage, or when infected fleas were placed on healthy animals, the screen was wired to the angle irons to prevent any possibility of the rodents escaping. The portion of the inner surface of the can above the diaphragm was smeared with "tangle-foot" to prevent the escape of any fleas that might be inclined to wander up the sides of the can. When guinea pigs were used, a crock usually replaced the garbage can. A muslin covered wire screen served as a lid for the container. In addition to these precautions, the cage was placed in a galvanized iron tank, in the bottom of which was a thin layer of kerosene. This served to form a moat through which it was believed no parasite could pass.

From squirrel to squirrel by means of squirrel fleas (December 16, 1909).—A ground squirrel was inoculated subcutaneously with a broth culture of *B. pestis* derived from a human case of plague. This animal died on the fifth day. Three days before its death, 100 fleas, *C. acutus*, were put in the cage with it. While yet warm the dead rodent was removed from the cage, and 27 live fleas were taken from its body. Two of these were crushed, and staining of the resulting smears showed an abundance of pest-like bacilli in each. The 25 fleas remaining were put in a clean cage with a healthy squirrel. This animal died of subacute plague 10 days later, the buboes being in the region of the median, posterior inguinal, and pelvic glands. A pure culture of *B. pestis* was obtained from the liver. This experiment is conclusive in showing that *C. acutus* may convey plague from a sick to a healthy squirrel. It should be stated here that all of the squirrels were kept in quarantine for at least a month prior to their being used for the experiment. This was to exclude the use of any naturally infected ones. In fact all of these squirrels were obtained in a region in which no plague squirrels have ever been found.

From squirrel to guinea pig by means of squirrel fleas (November 23, 1909).—A healthy squirrel was inoculated subcutaneously with a culture of *B. pestis* obtained from the Hygienic Laboratory, Washington, D. C., that is, it was not a California strain of the organism. This animal died on the seventh day, and at necropsy presented the usual lesions of subacute plague in the ground squirrel. Three days before death occurred, 82 fleas (*C. acutus*) were introduced. Four guinea pigs were placed in the cage with the dead rodent and permitted to remain for half an hour, after which the squirrel was removed and dissected. The object was to permit the fleas to desert the dead animal, and to go to the live ones. The fate of these guinea pigs is best shown by the following table:

Guinea pig No.	Day of death.	Lesions.	Location of bubo.
1	Fifth	Acute plague	Left inguinal.
2	do	do	Do.
3	Sixth	do	Multiple: 1 right inguinal, 1 neck.
4	Ninth	Subacute plague	Multiple: bilateral inguinal.

From squirrel to guinea pig by means of squirrel fleas (November 23, 1909).—This experiment was begun on the same day as the one immediately preceding, and the same culture was used to inoculate the squirrel. This animal died on the ninth day, and presented at autopsy the lesions of subacute plague. Four days before death, 89 fleas (*C. acutus*) were placed in the cage. When the squirrel succumbed, 4 guinea pigs were introduced and allowed to remain with the dead animal for half an hour. The fate of these guinea pigs is shown by the following table:

Guinea pig No.	Day of death.	Lesions.	Location of bubo.
1	Eighth	Subacute plague	None.
2	Twelfth	do	Right axilla.
3	Sixteenth; killed	None	
4	do	do	

From squirrel to white rats by means of squirrel fleas (March 24, 1910).—A squirrel which was vaccinated with the bubo of a guinea pig dead on the fifth day after inoculation from a naturally infected ground squirrel, died on the fifth day. Two days before its death, 220 fleas (*C. acutus*) were placed in the cage. After death 45 fleas were picked from the body and placed in a cage with 3 white rats. Two of these animals died of acute plague 5 days after the fleas had been put in with them. In one the bubo was in the neck; the other had two buboes, one in the axilla and one in the inguinal region. The third white rat was chloroformed two days after the death of his fellows and was found to be entirely healthy. In this case the evidence of infection of the white rat by means of squirrel fleas is conclusive, as there was no other way in which they might have acquired the disease.

From guinea pig to guinea pig by means of squirrel fleas (October 12, 1909).—A guinea pig was vaccinated with tissue from a guinea pig dead after inoculation from a case of natural squirrel plague. Four days later 100 fleas (*C. acutus*) were put in the cage. The animal died on the seventh day after vaccination, 3 days after the fleas were introduced, and presented the lesions of acute plague. The rodent was allowed to remain in the cage for 24 hours after death in order to give the fleas ample time to leave the body. After it was removed, 2 fresh guinea pigs were introduced. One of the latter died on the sixth, the other on the eighth day. Both had the usual lesions of plague, the buboes being in the inguinal region. A pure culture of *B. pestis* was isolated from each animal.

From white rat to squirrels by means of rat fleas (April 12, 1910).—A white rat was vaccinated with a bubo from a white rat dead on the sixth day after inoculation with a culture of *B. pestis* of squirrel origin. Four days later 107 rat fleas (*C. fasciatus*, Bosc), which had been starved for 48 hours, were placed in the cage with this rodent. The animal died about 24 hours after the fleas were introduced. Fifty fleas were removed from the body and were placed in a clean cage with a healthy squirrel. This animal died of plague 10 days later, the bubo being in the inguinal region. About an hour after the removal of the dead white rat from the cage, a healthy squirrel was placed in it. This rodent was chloroformed while moribund on the seventh day, and found to be suffering from plague. The bubo was in the inguinal region. From this squirrel, as well as from the one infected by introducing the rat fleas into a clean cage, a culture of the plague bacillus was isolated.

The question might be raised that some of the animals believed to have been infected by fleas in reality had contracted the disease from mere contact with contaminated surroundings, other than insects, or by ingestion of feces from the sick rodents. We have frequently placed healthy guinea pigs in cages with plague-infected ones, but have never observed any spread of the disease if fleas were not present. This agrees with the results of extensive experiments conducted by the advisory committee appointed by the Secretary of State for India, the Royal Society, and the Lister Institute.[1]

In the two following experiments an infected animal was placed in a cage with 6 healthy ones, but without fleas, while in an adjacent cage the same conditions obtained, and in addition 100 squirrel fleas (*C. acutus*) were introduced. In each case the infecting agent was a culture of *B. pestis* of squirrel origin.

From guinea pig to guinea pig by means of squirrel fleas (November 11, 1910).—In this experiment, both inoculated guinea pigs died on the third day. The 6 healthy rodents in the cage without fleas remained well while 3 of those in the cage into which the fleas had been introduced died of plague, as shown in the following table:

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[1] Journal of Hygiene, Vol. VI, No. 4, May, 1906, p. 509.

Guinea pig No.	Day of death.[1]	Lesions.	Location of bubo.
1	Tenth	Acute plague	Inguinal.
2	Thirteenth	Subacute plague	Cervical.
3	Nineteenth	do	Inguinal.
4	Remained well		
5	do		
6	do		

[1] Counting from beginning of experiment.

From white rat to white rat by means of squirrel fleas (November 11, 1910).—An experiment identical with the preceding one was carried out with the exception that white rats were used instead of guinea pigs. The inoculated rat in the cage in which there were no fleas died on the third day. Upon removing the body, it was found to be partly devoured. Three of the "contacts" died of acute plague on the eighth day after the beginning of the experiment (i. e., 5 days after the death of the inoculated animal) all of the buboes being in the neck. The location of the buboes led to the conclusion that probably the infection had been acquired by feeding on the body of the inoculated rat. The importance of the location of the bubo is fully discussed by the advisory committee previously referred to.[1] The three rats that remained were chloroformed on the twelfth day after the beginning of the experiment and were found free from lesions. Whether the 3 that escaped infection were less cannibalistically inclined than their comrades we do not know.

With the rats that were in the cage with the fleas, the results were very different. In this case the inoculated animal died on the third day and its body had not been mutilated. All of the "contacts" died of plague in the order shown in the following table:

White rat No.	Day of death.[1]	Lesions.	Location of bubo.
1	Eighth	Acute plague	Axillary and inguinal.
2	do	do	None.
3	Twelfth	do	Inguinal.
4	Thirteenth	do	None.
5	do	do	Axillary.
6	Fourteenth	do	Inguinal.

[1] Counting from beginning of experiment.

After the death of the last one, 6 fresh white rats were put in the cage. Prior to introducing them the dead rat was surrounded by a wire screen, so that the new tenants could not touch the dead rodent, yet an opportunity was given for fleas to leave the dead animal for a living host. Three of these rats were found dead 5 days later. All had typical lesions of plague, the bubo in one being in the axilla, in another in the inguinal region, and the third had multiple buboes, one in the axilla and one in the inguinal region. The other 3 rats were chloroformed and found free from lesions.

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[1] Journal of Hygiene, Vol. VII, No. 3, 1907, p. 382.

SUMMARY.

Plague bacilli have been demonstrated in squirrel fleas (*Ceratophyllus acutus*, Baker) and in the feces from these insects by the inoculation test. The bacilli have been demonstrated in feces 4 days after removal of the fleas from the host.

Squirrel lice (*Hæmatopinus columbianus*, Osborn) taken from septicæmic plague squirrels often harbor the plague bacillus. The bacilli have been demonstrated in the lice at least 14 days after their removal from the host.

It has been shown beyond question that plague may be conveyed from one ground squirrel to another or from a ground squirrel to white rats by means of squirrel fleas (*C. acutus*) and from a white rat to a ground squirrel by means of rat fleas (*C. fasciatus*).

It has been shown, but perhaps less conclusively on account of the rather remote possibility of infection from contaminated surroundings other than fleas, that plague may be conveyed from squirrels to guinea pigs or to white rats, among guinea pigs, and among white rats by means of squirrel fleas (*C. acutus*).

A PLAGUE-LIKE DISEASE OF RODENTS.

[From the Federal laboratory, San Francisco, Cal.]

By George W. McCoy, *Passed Assistant Surgeon.*

During the routine examination of ground squirrels we have encountered an infection the lesions of which are readily mistaken for those of plague. This disease also causes pathological changes in guinea pigs that are almost indistinguishable from those due to infection with *B. pestis* and occasionally produces plague-like lesions in rats and mice.

It is barely possible that we unknowingly have dealt with more than one disease entity, as no etiological agent has been discovered, and for a diagnosis we are compelled to rely upon the lesions produced in laboratory animals and the negative results of microscopical and cultural investigations. The post-mortem appearances in guinea pigs, where they are remarkably uniform and constant, afford the chief evidence upon which a diagnosis is based.

GEOGRAPHICAL DISTRIBUTION.

The disease has been observed in squirrels coming from many points. We have found it in those from nine counties, all lying between Los Angeles on the south and the Sacramento River on the north. The infection has been discovered in districts and even on ranches that have furnished plague squirrels as well as in those sections in which plague has not been demonstrated.

GROSS LESIONS.

GROUND SQUIRRELS NATURALLY INFECTED.

The following description is based upon the examination of 32 squirrels so infected:

Bubo.—The bubo is usually about the size of a pea, often larger, rather firm, and when cut presents a dry, yellowish, or blood-stained surface. Some hemorrhage is frequently found in the surrounding tissue. The gland structure is generally replaced by a firm caseous mass. Purulent glands have been seen, but are not common. In about 20 per cent of the cases a bubo was the only lesion observed.

Spleen.—When involved this organ is very much enlarged, perhaps to four or five times the normal size. It is fairly firm in consistency unless post-mortem changes have occurred. The color is generally dark, almost black, or slate blue. Whitish or yellowish caseous granules varying in size from a pin's point to about 1 mm. in diameter, and in number from a dozen to so many as to be uncountable, are found throughout the tissue. They often project slightly above the surface of the organ. Pl. VI, fig. 11.

Liver.—Granules similar to those found in the spleen are frequently found in the liver, sometimes being more numerous than in the spleen. Quite often they are ashen gray in color.

Lungs.—These organs are very rarely involved, but in one case we have observed granules like those found in the liver and in the spleen. Occasionally the tissues are slightly jaundiced.

The following table shows the frequency of the various lesions in squirrels naturally infected:

Bubo:	
Present	29
Absent	3
Single—	
Inguinal	5
Axillary	4
Cervical	8
Pelvic	6
	23
Multiple—	
Inguinal and pelvic	4
Cervical and axillary	1
Cervical and inguinal	1
	6
Spleen granules:	
Present	24
Absent	8
Liver granules:	
Present	11
Absent	21
Lung granules:	
Present	1
Absent	31

INOCULATED SQUIRRELS.

As these animals were examined very soon after death, remarkably clear and distinct lesions were found. The only essential point of difference from the naturally infected squirrels was the presence of a local reaction at the site of inoculation. When the rodent had been infected by the cutaneous method (vaccination), there was a small scab and some thickening at the site, while occasionally a few papules were found. When the inoculation was by subcutaneous injection or by implanting a piece of tissue in a subcutaneous pocket, there was a large purulent reaction, often hemorrhagic, occasionally gelatinous. The bloody exudate may extend to and surround the nearest lymph glands. Once or twice we have seen punctate hemorrhages in the lungs, and once a few granules.

Necrotic foci are constant in the liver and spleen of inoculated rodents dead of this disease, while in those naturally infected they are often absent. Probably this is due to the fact that often the latter are shot before the lesions have fully developed, while in the inoculated ones the disease is permitted to run its course.

INOCULATED GUINEA PIGS.

The lesions of the plague-like disease in these rodents are so similar to those of plague that while workers who have acquired a considerable degree of familiarity with both can usually differentiate them, yet cases are occasionally seen in which an error in the judgment of the gross lesions is made by the most experienced.

Reaction at the site of inoculation.—When a guinea pig has been vaccinated, there is a little thickening beneath the scab, often marked congestion, or a slightly hemorrhagic and occasionally gelatinous exudate. When the infecting material has been introduced beneath the skin, the reaction most commonly found is a dry, yellowish-white area resembling a membrane inserted between the muscles and the skin. Very rarely a large bloody exudate is seen.

Bubo.—When the inoculation is on the belly wall, the inguinal gland chains on both sides are usually enlarged and necrotic. (Pl. V, fig. 9.) The individual elements are about the size of a pea. The caseous matter is yellowish, dry, and sometimes hemorrhagic. A waxy appearance is quite characteristic. A bloody exudate surrounding the glands is rather frequent. The pelvic glands, those lying on each side of the midline just above the brim of the pelvis, are often involved when the primary bubo is in the inguinal region. In these cases fine pearly-white granules are usually seen following up the course of the great abdominal vessels. A bubo is a constant lesion, except in cases of intraperitoneal inoculation. It is present even in cases where the infection has been introduced through the nose (cervical) and in those where the disease has been induced by feeding (cervical or abdominal).

Spleen.—This organ is very large, friable, dark in color, and is almost always thickly studded with very distinct white granules up to 1 mm. in diameter (Pl. VII, fig. 13), which tend to vary in size more than do those in plague.

Liver.—Granules like those found in the spleen are very numerous although generally not so thickly set as in that organ. (Pl. VI, fig. 12.)

The liver sometimes shows irregularly shaped yellowish-green areas, the exact nature of which is not known.

Lungs.—Patchy congestion is common. Punctate hemorrhages are occasionally seen. Very rarely we see fine white granules similar to those in the liver and spleen. Serous pleural effusion has been observed on a few occasions.

In squirrels and in guinea pigs the lesions are remarkably constant. The animals always die of an acute infection, and there is very little variation in the findings in individual members of each species.

It is convenient to compare the lesions with those of plague as seen in ground squirrels and in guinea pigs by placing brief descriptions of the gross appearances of the two diseases in parallel columns. For the sake of completing the comparison the findings in smears and cultures are added to the table.

	Plague.	Plague-like disease.
Reaction at site, vaccination.	Brawny œdema with marked thickening.	Slight scab and moderate thickening.
Reaction at site, subcutaneous inoculation.	Large, œdematous, and purulent	Whitish membrane-like area, rarely œdematous.
Bubo	Surrounding exudate usually extensive; bubo dry, mealy, not waxy, often bloody.	Surrounding exudate less extensive; bubo waxy looking, pink, less frequently bloody.
Spleen	Enlarged; granules less distinct, usually more uniform in size.	Enlarged; very distinct discrete granules, often varying in size.
Liver	Granules usually absent or few in number.	Granules numerous and almost constantly present.
Lungs	Granular or nodular, lesions common.	Lesions rare.
Smears	Characteristic bacilli	Negative.
Cultures	*B. pestis* readily recovered	Do.

The table refers more particularly to the guinea pig, though it is to a large extent applicable also to the ground squirrel. In a general way it may be said that the lesions differ from those of plague in degree rather than in character.

PATHOLOGICAL HISTOLOGY OF THE PLAGUE-LIKE DISEASE.

This subject has been investigated only superficially. The remarks apply to guinea pigs and to ground squirrels.

Glands.—The glands involved show an extensive focal infiltration of round and polynuclear leucocytes. In some of the areas the nuclei show evidence of disintegration.

Spleen.—Aggregations of round and polynuclear cells are found scattered throughout the organ.

Liver.—The lesions may be demonstrated particularly well in this organ. The infiltration of new cells is often in the region where the bile duct, hepatic artery, and portal vein lie together. The areas made up of round and polynuclear cells replace the liver tissue for the most part, though sometimes the large vesicular nuclei of the liver cells may be seen lying well within an area of infiltration. The centers of the foci often show a tendency to stain rather deeply with eosin. In other words, the lesions (in general) are those of a focal necrosis and the formation of minute abscesses.

PATHOGENICITY FOR RATS.

Mus norvegicus.—The experiments on rats have given rather irregular and to some extent contradictory results. It was believed at first that the lack of success in infecting *Mus norvegicus* (tame white and wild) offered a ready means of distinguishing this interesting disease from plague, though it was borne in mind that rats in general, even white ones, are not so uniformly susceptible to plague as are guinea pigs. This is especially true of the strain of *B. pestis* isolated from ground squirrels.

In the first case of this disease that came under observation, one rat was vaccinated and another inoculated from the spleen of a guinea pig dead on the sixth day after inoculation from a squirrel. Both of these rats were chloroformed on the seventh day. The vaccinated one was found to be entirely normal, while the one inoculated by the subcutaneous method had a small purulent reaction at the site, enlarged superficial lymph glands, and an enlarged dark spleen. The control guinea pig died on the seventh day with the usual lesions of the plague-like disease. Tissue from the second case was used to vaccinate a white rat. This rat died on the third day with lesions strongly suggestive of plague. A guinea pig vaccinated with the same tissue died on the seventh day with the usual lesions of the plague-like disease. In a third case, a white rat vaccinated directly from the spleen of a squirrel was found to be entirely normal when chloroformed on the fourteenth day, while the control guinea pig died on the sixth day with the usual lesions. These rather contradictory results led to the performing of several other experiments.

Variation of dose.—It appeared to be wise to try the influence of graduated doses of the infecting agent upon rats. Accordingly, the following series of inoculations was made, each animal being injected subcutaneously with an emulsion made from the liver of a guinea pig dead on the eighth day after inoculation:

Animal.	Size.	Dose.	Result.
Gray rat	Grown	2 c. c. of emulsion	Killed twenty-fourth day; no lesions.
Do	do	do	Died sixth day; lesions as below noted.
Do	do	1 c. c. of emulsion	Killed twenty-fourth day; no lesions.
Do	Half grown	0.1 c. c. of emulsion	Do.
Guinea pig (control)	Grown	do	Died on sixth day; usual lesions of plague-like disease.

The rat that died on the sixth day presented an enlarged mottled spleen, a liver studded with fine whitish granules, and a hemorrhage in the right axilla. The latter we thought might be traumatic. Cultures from the liver and from the heart's blood remained sterile, the usual result in this disease. The spleen of this rat was used to vaccinate a guinea pig, and as the latter remained entirely healthy, it is not possible to say whether the rat died of the disease under consideration. It will be shown later that it has been possible to demonstrate the presence of the disease in rats by the guinea-pig vaccination test.

Intraperitoneal inoculation of white rats.—One experiment was performed for the purpose of ascertaining the effect of intraperitoneal inoculation. An emulsion of liver tissue from a guinea pig dead on the sixth day was injected into the abdominal cavities of two half-grown white rats. Both of the rats died; one on the third and the other on the sixth day. There were no lesions in either case beyond an enlarged spleen, and it would have been impossible to have assigned any particular cause for the death of these animals but for the fact that spleen tissue from each was used to vaccinate a guinea pig, with the result that both guinea pigs died of the plague-like disease, one on the sixth and the other on the seventh day.

Rats sometimes die after a considerable time, and while they present no distinct lesions it can be shown that they harbor the infecting agent. This is demonstrated in the following experiment. Spleen emulsion from a guinea pig dead on the sixth day was used to inoculate the animals mentioned:

Animal.	Size.	Dose.	Result.
Gray rat	Half grown	1 c. c. emulsion, subcutaneously.	Died thirteenth day; no lesions, but spleen used to vaccinate a guinea pig which died on ninth day with usual lesions.
Do	do	2 c. c. emulsion, subcutaneously.	Died on fifteenth day; no lesions; guinea pig inoculated, negative.
Do	do	do	Died sixtieth day; no lesions; guinea pig inoculated, negative.
Do	do	0.1 c. c. emulsion, subcutaneously.	Died fourteenth day; no lesions.
Guinea pig (control)	410 grams	Vaccinated	Died sixth day; usual lesions.

When examined after death the first rat presented no lesions whatever, but the spleen used to vaccinate a guinea pig reproduced the disease in that rodent.

In another case a rat which died on the ninth day after subcutaneous inoculation had no lesions beyond an enlarged spleen, but the infection was reproduced in a guinea pig vaccinated from the rat's spleen.

In the following experiment the rats (wild *Mus norvegicus*) were apparently entirely refractory. Unfortunately guinea pigs were not inoculated from them to determine whether they harbored the infection at the time they were killed. The infecting agent was spleen emulsion from a guinea pig dead on the seventh day after vaccination from a naturally infected squirrel.

Animal.	Weight. *Grams.*	Dose.	Result.
Gray rat	230	1 c. c. spleen emulsion, subcutaneously.	Killed fourteenth day; enlarged spleen.
Do	265	1 c. c. spleen emulsion, subcutaneously.	Do.
Guinea pig	315	Vaccinated, spleen emulsion	Died sixth day; usual lesions.
Do	370	do	Do.

In addition to these experiments that have been recorded in detail we have inoculated a considerable number of white rats and gray rats. The great majority of these have proved immune to the infection.

Mus rattus.—One experiment has been performed with this species. Three of the rodents were inoculated with an emulsion made from the liver of a ground squirrel dead of the disease. One of the rats was vaccinated and two were inoculated subcutaneously. One of the latter died on the third day; the others remained well. A guinea pig (control) vaccinated with the same material died of the plague-like disease on the seventh day.

PATHOGENICITY FOR MICE.

With so low and uncertain a degree of virulence for rats it was thought that other members of the genus *Mus* would probably prove resistant, but attempts to infect mice negatived this view.

In the first experiment four gray mice were inoculated with the spleen of a guinea pig dead on the seventh day after vaccination from a squirrel. Two of the mice were infected by the subcutaneous method; one of these died on the third, the other on the fourth day. Two were inoculated by rubbing the spleen of the guinea pig on the shaved abdomen; one died on the fifth, the other on the sixth day. None of the mice presented any well-defined lesions. Two control guinea pigs died on the sixth day and presented the usual appearances of animals dead of the plague-like disease.

In the following experiment the dose was varied, and tissues from several of the mice were used to vaccinate guinea pigs for the purpose of ascertaining whether the mice had actually been infected with the disease (i. e., to exclude death from other causes).

The mice and the control guinea pig were inoculated subcutaneously with an emulsion made from the heart's blood of a guinea pig just dead of the disease.

Animal.	Dose.	Day of death.	Result of vaccination of guinea pig from spleen of dead mouse.
White mouse	Contaminated needle thrust under the skin.	Seventh	Dead sixth day; usual lesions of plague-like disease.
Do	do	do	No guinea pig used.
Do	0.1 c. c. emulsion, subcutaneously.	Fourth	Dead sixth day; usual lesions of plague-like disease.
Do	do	Sixth	Do.
Do	1 c. c. emulsion, subcutaneously.	Fourth	Do.
Do	do	do	No guinea pig used.
Guinea pig (control)	0.1 c. c. emulsion, subcutaneously.	Seventh	

The lesions in mice are not very well defined. In one or two instances lymph glands were enlarged, and one was probably caseous. The spleen was usually several times the normal size, and rather obscure granules were found in a few cases in this organ and in the liver. In several other experiments mice have been inoculated, and in every case have succumbed to the infection.

PATHOGENICITY FOR RABBITS.

Rabbits (Belgian hares) have been used in two experiments. One was vaccinated with spleen from a guinea pig dead on the seventh day. This rabbit died on the tenth day; the control ground squirrel (also vaccinated) died on the ninth day. In the second experiment a rabbit was inoculated subcutaneously with 1 c. c. of spleen emulsion from a guinea pig dead on the seventh day. This animal died on the ninth day. A control guinea pig given the same quantity of the emulsion died on the fifth day.

Lesions.—In the case of the vaccinated rabbit there was a small scab at the site; in the inoculated one there was a necrotic area about 2 cm. in diameter where the injection was made. Buboes were present in each case, the glands being about the size of a pea, and full of small yellowish-white points. The spleen and the liver of each animal were full of whitish granules, the largest being the size of a mustard seed. In the case of the rabbit dying on the tenth day, the omentum was filled with granules and nodules, and the diaphragm was studded with white granules. A white rat was inoculated in each case from the same material that was used to inoculate the rabbit and the control guinea pig, but with negative results.

PATHOGENICITY FOR GROUND SQUIRRELS.

As this disease was found in ground squirrels in nature, special interest attaches to the experimental reproduction of it in these rodents. It has not been feasible to use ground squirrels as extensively as we wished because they are difficult to obtain alive. For this reason the great bulk of our work has been done with guinea pigs, and it is of course important to establish that the disease in these animals is the same as that found in the naturally infected squirrels. This we have done by inoculating squirrels from guinea pigs.

In the first experiment, a piece of liver from a guinea pig dead on the fifth day (second remove from naturally infected squirrel) was placed in a subcutaneous pocket in a ground squirrel. This animal died on the sixth day. The lesions were a purulent and hemorrhagic reaction at the site, a bloody exudate extending down over the thighs, and a yellowish caseous bubo. The spleen was full of white granules, the largest being perhaps 1 mm. in diameter. The liver contained granules similar to those in the spleen. There were punctate hemorrhages in the lungs. Here we have an example of the transmission of the disease by inoculation from a naturally infected squirrel to a guinea pig, through two generations in the guinea pig, and back into the squirrel. In order to carry the demonstration one step further, two guinea pigs were vaccinated from the spleen, and two inoculated subcutaneously with a small amount of heart's blood from the squirrel. These rodents all died with the usual lesions and in the usual time.

In another experiment, a ground squirrel was vaccinated with the spleen of a guinea pig (second remove in guinea pigs from a squirrel) dead on the seventh day. The squirrel died on the eighth day and presented lesions similar to those above described, and in addition a few whitish granules were found in the lungs. Ground squirrels have been infected in several other experiments that are of no special interest in this connection. No case of immunity to this disease has been observed. It is apparently more regularly fatal to these animals than is plague.

PATHOGENICITY FOR GOPHERS (THOMOMYS BOTTAE).

In order to determine the susceptibility of the gopher, two of these rodents which had been in stock for over a year were used. One was inoculated subcutaneously with 1 c. c. of spleen emulsion from a guinea pig dead of the plague-like disease on the sixth day, and the other was vaccinated with a loopful of the same emulsion. The gopher inoculated subcutaneously died on the third day and presented a small bubo, and an enlarged spleen which contained a number of minute whitish granules. The vaccinated gopher died on the fourth day with a bubo and granular lesions in the spleen. There was a bilateral clear serous pleural effusion in this case. That the second gopher died of the plague-like disease is proven by the fact that its spleen was used for the purpose of inoculating a guinea pig which died with typical lesions on the fifth day.

PATHOGENICITY FOR ANIMALS OTHER THAN RODENTS.

MONKEYS.

Two experiments have been made on monkeys. In the first, two animals were used, both being inoculated subcutaneously; one with 1 c. c. of an emulsion made from the liver of a guinea pig dead on the seventh day, the other with 0.5 c. c. of a salt solution suspension of the heart's blood of the same animal. Guinea pig controls inoculated with 0.1 c. c. of the liver emulsion and 1 c. c. of the heart's blood emulsion both died on the sixth day with the usual lesions of the plague-like disease. The first monkey (Java) perished on the eighth day, and the second (Rhesus) on the seventh day. In one case there was at the site of inoculation a whitish necrotic area such as has been mentioned under the head of lesions in the guinea pig; in the other, nothing was found to indicate the point where the infection was introduced. In each, a rather small caseous lymph gland was found, and the spleen appeared to be very much swollen. In one case, numerous fine granules were present in that organ. The other tissues appeared to be normal. Cultures from one monkey were sterile. None were made from the other. While the writer has no doubt but that the monkeys died of this disease, it should be stated that a guinea pig vaccinated from the liver of the monkey that died on the eighth day remained well. The liver had been kept in the ice chest several days before the guinea pig was inoculated.

In another experiment, a guinea pig, four white rats, and four white mice were used as controls for a monkey (Rhesus). All of the animals were vaccinated on the abdomen with the spleen of a guinea pig dead on the fourth day.

The results are shown in the following table:

Animal.	Weight.	Day of death.	Remarks.
	Grams.		
Guinea pig	315	Fifth	Characteristic lesions.
Monkey [1]		Eighth	Plague-like lesions.
White rat	70		Remained well.
Do	60		Do.
Do	60		Do.
Do	40		Do.
White mouse		Fourth	
Do		do	
Do		Fifth	
Do		do	

[1] This monkey had proven immune to vaccination with a virulent culture of the plague bacillus.

A white rat and a guinea pig were inoculated from the spleen of the monkey. The former remained well, while the latter died on the sixth day with the usual lesions of the plague-like disease.

The following is a brief description of the lesions noted in this monkey: A caseo-purulent bubo was found in the axilla, and another in the inguinal region. There was but little surrounding infiltration. The spleen was much enlarged and contained many caseous granules, varying in size from a pin point to 2 mm. in diameter. The other organs were negative.

CATS AND DOGS.

But one attempt has been made to infect these animals. Varying doses of a spleen emulsion of a guinea pig dead on the fifth day were employed to inoculate them subcutaneously. Three young cats and two young dogs were used and none of them appeared to suffer any bad effects from the inoculation. All were carefully examined on the fourteenth day and found to be without any reaction at the site of inoculation or any indication of a bubo. A control guinea pig died on the sixth day with the usual lesions of the disease. It would seem safe to infer that cats and dogs are probably not susceptible to this infection.

PIGEONS.

The spleen of a guinea pig dead on the seventh day after inoculation from a naturally infected squirrel was used to inoculate subcutaneously two pigeons. The birds remained alive and apparently well, while two control guinea pigs died on the sixth day with the usual lesions. A second experiment with pigeons gave a like result.

The susceptibility of animals to this disease and to plague is shown in the following table:

Animals, etc.	Plague.	Plague-like disease.
Monkeys	Susceptible	Susceptible.
Cats	Moderately susceptible	Immune.
Dogs	Immune	Do.
Guinea pigs	Susceptible	Susceptible.
Rats	do	Usually immune.
Mice	do	Susceptible.
Rabbits	do	Do.
Ground squirrel	do	Do.
Gophers	Moderately susceptible	Do.
Pigeons	Immune	Immune.

SYMPTOMS.

As to the clinical manifestations of the disease, but little is to be said. When an infected guinea pig is examined on the third day or later, a reaction at the site of inoculation is found, but it is by no means so conspicuous as that found in plague. The animal refuses food, sits humped up; the coat is rough and the eyes are closed. When the end approaches, the animal lies on its side, gasps for breath, and slight spasmodic movements of the body and limbs occur.

We are acquainted with the difficulty in drawing any conclusions from temperature observations in guinea pigs, as the rectal temperature varies materially in apparently healthy rodents. Our efforts to determine whether the disease is a febrile one were confined to two series of temperature observations. In each case the control was kept in the same cage with the sick animal.

	Temperature (degrees F.) of—	
	Infected guinea pig.	Control guinea pig.
First experiment.		
At inoculation	101.3	101.2
48 hours after inoculation	102.6	98.6
72 hours after inoculation	103.6	99.6
Dead next day.		
Second experiment.		
At inoculation	99.6	97.6
First day:		
Morning	99.2	97.4
Evening	101.8	97.2
Second day:		
Morning	102.6	97.0
Evening	105.0	97.2
Third day:		
Morning	103.8	96.6
Evening	104.6	96.8
Fourth day:		
Morning	104.6	96.5
Evening	(1)	(1)
Fifth day:		
Morning	104.0	96.8
Evening	103.4	98.6
Sixth day:		
Morning	98.0	97.0
Evening	(2)	....

[1] Omitted.

[2] Animal dead.

METHODS OF EXPERIMENTAL INOCULATION.

SUBCUTANEOUS INJECTION AND VACCINATION.

These methods have been so extensively used in the experiments recorded in the earlier part of this paper that it seems unnecessary to mention them further than to remark that both are certain and reliable methods of infecting susceptible animals.

In one experiment two guinea pigs of about equal weight were vaccinated with the spleen from a guinea pig dead on the seventh day after inoculation from a naturally infected squirrel. One was vaccinated in the ordinary way, the skin being slightly abraded in the shaving; while with the other, care was taken not to injure the skin. In each case the tissue was rubbed on firmly with forceps. Both died on the sixth day with the usual lesions. An unsuccessful attempt was made to infect a guinea pig by clipping the hair with scissors instead of using the barber's clippers, and smearing the infected tissue on the surface, not rubbing it in.

INTRAPERITONEAL INOCULATION.

We have used this method but once. An emulsion of tissue from a guinea pig dead on the seventh day was injected into the peritoneal cavity of a guinea pig. The inoculated animal died on the third day. There was no evidence of peritonitis. The liver and spleen presented the usual granular lesions. Intraperitoneal inoculation of rats has been mentioned elsewhere.

NASAL INOCULATION.

It seemed worth while determining whether the introduction of the infecting agent through the respiratory passages would give rise to lesions in the lungs. A small pledget of cotton saturated with an emulsion of spleen from a guinea pig dead on the sixth day was placed in one of the nostrils of a guinea pig. This rodent died on the sixth day with the usual lesions, the bubo being in the neck. The lungs were negative. We thought that possibly some abrasion of the nasal mucous membrane had occurred through which infection had entered that led to the formation of the cervical bubo. A second experiment was undertaken in which a drop of a liver emulsion from a guinea pig dead on the eighth day was dropped into the nostril. This guinea pig died on the sixth day and at autopsy was found to have buboes in the neck and the other usual lesions of the disease. There were no changes in the lungs beyond a few hemorrhagic points such as are occasionally seen in guinea pigs inoculated in other ways. In neither case was there evidence of pneumonia or of focal lesions in the lungs.

FEEDING EXPERIMENTS.

Two guinea pigs were fed with chopped carrots mixed with blood and viscera from an artificially infected squirrel. One died on the seventh day after the feeding, and presented the usual lesions, the bubo being in the neck; the other remained well.

We have attempted to infect but one squirrel by feeding. The viscera of a squirrel dead on the ninth day after inoculation was fed to a squirrel. This animal died eight days later. The lesions were small caseous buboes in the neck, and numerous yellowish caseopurulent masses in the mesentery. The wall of the intestine contained a few thickened yellowish patches.

Attempts to infect rats by feeding have been uniformly unsuccessful.

NATURE OF INFECTION.

Having learned something about the susceptibility of the various animals, the modes of artificial infection, and the lesions in those to which we succeeded in communicating the disease, we will now present the results of experiments having to do with the nature of the infecting agent. Although we have not been able to cultivate any organism that we regarded as etiological, certain facts bearing upon the causative agent have been demonstrated.

A SEPTICÆMIA.

The nature of the lesions, an involvement of a lymph gland or a chain of lymph glands draining the site of inoculation, with focal lesions in the viscera, would lead one to suppose that the disease was, at least in some stages, due to an organism present in the blood. Mention has been made in an earlier part of the paper of the successful inoculation of animals from the heart's blood of rodents dead of the disease. We shall record here experiments in which the heart's blood was diluted, and the dilutions injected into susceptible animals, thus enabling us to determine within rather wide limits, the degree of septicæmia present.

In the first experiment, the heart's blood of a guinea pig dead on the eighth day was diluted and used a few hours after death. Each animal received the dose indicated in the table suspended in 1 c. c. of physiological salt solution.

Animal.	Weight.	Dose.	Day of death.	Lesions.
	Grams.			
Guinea pig	260	0.01 c. c. heart's blood	Fifth	Characteristic.
Do	240	0.0001 c. c. heart's blood	do	Do.
Do	220	0.000001 c. c. heart's blood	Sixth	Do.
Do	330	0.00000001 c. c. heart's blood	Tenth	Do.

In this particular instance it would appear that 0.00000001 c. c. of the blood was sufficient to convey the disease. In the next experiment the heart's blood of the guinea pig dead on the tenth day (inoculated with 0.00000001 c. c.) was used to inoculate another series of guinea pigs. The results are shown in the following table:

Animal.	Weight.	Dose.	Day of death.	Lesions.
	Grams.			
Guinea pig	300	0.001 c. c. heart's blood	Fifth	Characteristic.
Do	350	0.0001 c. c. heart's blood	Seventh	Do.
Do	480	0.000001 c. c. heart's blood	Remained well	
Do	400	0.00000001 c. c. heart's blood.	do	

In this case the animals receiving less than 0.0001 c. c. were unaffected.

These experiments clearly demonstrate that the disease is due to an organism that is present in large numbers in the heart's blood after death.

DURATION OF INFECTIVENESS OF TISSUES.

Tissues have been kept in the ice box, and after varying periods used to inoculate guinea pigs. The results have not been constant, probably because the conditions have not always been similar. On one occasion tissue retained its infecting power for 18 days; in other cases it appeared to have died out by a sojourn of 4 or 5 days in the ice box.

At room temperature in one case infectivity remained for 6 days, at which time the last inoculation was made. Tissue of the same rodent dried in the incubator for 48 hours failed to convey the disease to a guinea pig.

THERMAL DEATH POINT.

Two experiments were performed for the purpose of determining the degree of heat necessary to kill the organism that causes the disease.

An emulsion of liver of a guinea pig dead on the eighth day was used. It was found that heating it in the Arnold Sterilizer at from 60° C. to 65° C. for 5 minutes has the effect of rendering it harmless, while the control animal inoculated with the same material unheated died on the fifth day with the usual lesions. In a second experiment an emulsion made from the spleen of a guinea pig dead on the seventh day was placed in small test tubes and heated in a water bath at the temperatures stated in the following table. The emulsion was then injected into the guniea pigs with the results shown below. One cubic centimeter was the amount heated and injected in each case. The tubes were plugged with cotton and the portion containing the fluid was immersed several inches below the surface of the warm water.

Animal.	Weight.	Degree of heat.	Heat applied.	Day of death.	Lesions.
	Grams.	° *C.*	*Min.*		
Guinea pig	255	45	10	Third	Characteristic.
Do	340	50	10	Fourth	Do.
Do	290	55	10	Fifth	Do.
Do	300	60	10	Remained well	
Do	270	65	10	do	
Guinea pig (control)	330	(1)		Fifth	Characteristic.

[1] Unheated.

The results of this experiment indicate a thermal death point about the same as that of most pathogenic bacteria.

EFFECT OF CERTAIN GERMICIDES.

A mixture of equal parts of salt-solution emulsion from the spleen of a guinea pig dead on the seventh day and glycerine conveyed the disease after standing 24 hours, but not after 72 hours. A mixture of the same emulsion with an equal volume of 2 per cent trikresol solution (making a 1 per cent mixture) was found free from the infecting agent after 2 minutes. No inoculations were made after a shorter exposure.

EXAMINATION OF STAINED SMEAR PREPARATIONS.

It was the absence of pest-like organisms in the first inoculated animal dead of this disease that led us to suspect that we were not dealing with plague. This is mentioned to illustrate the similarity of the lesions to plague, and the dissimilarity of stained smear preparations. Carbol-thionin, Loeffler's Alkaline Methylene Blue, Wright's stain and Giemsa's stain all usually fail to show the presence of anything that can be recognized as a micro-organism. The Ziehl-Nielson method likewise fails to show any organism. In many cases the smears show, especially in the leucocytes, fine dust-like objects which are not commonly seen in smears from the tissues of animals dead from other causes, although sufficient control work has not been done. At present we do not attach much significance to these objects, but they will be investigated more fully. Numerous very small, solid staining bacilli have been seen on a number of occasions. We can not say at present what importance should be attached to them.

CULTURAL INVESTIGATIONS.

All attempts to cultivate on artificial media the organism that causes this disease have been unsuccessful. In the great majority of cases the media remained sterile, or contained growths of what were obviously contaminating organisms. On several occasions cultures that grew on the media were used to inoculate guinea pigs, but without success in reproducing the disease. What has been said refers to aerobic cultures on agar and in broth and to liberal inoculations on the surface of agar or in broth with blood from infected squirrels and guinea pigs. Cultures in freshly steamed glucose broth in Dunham's fermentation tubes usually remained sterile, as did those in broth covered with oil. On one occasion a growth in a fermentation tube showed in smears rods and cocci. Some of the fluid from the tube was used to inoculate a guinea pig, with the result that the animal died of the disease on the ninth day. Cultures made from the guinea pig remained sterile. As the original fermentation tube had been heavily inoculated with the blood, we were inclined to attribute the death of the guinea pig to the blood in the mixture. Attempts to grow the causative organism are still being made.

FILTRATION EXPERIMENTS.

Several experiments have been made for the purpose of determining whether the cause of the disease was an organism small enough to pass through the so-called "bacteria proof" filters. The writer's experience with this class of work is so limited that he would hesitate to report any experiments tending to show that an organism was so small as to pass through one of these filters, and consequently small enough to raise a question as to whether it might belong to the class known as ultra-microscopic organisms. However, every experiment showed that the causative agent did not pass through the Berkefeld filter. In each case control animals died of the disease in the usual time, while those inoculated with the filtrate, secured under a negative pressure of 15 pounds, remained well.

MODE OF TRANSMISSION.

Several experiments have been made for the purpose of learning the natural mode of transmission of the disease.

CONTACT.

On several occasions healthy guinea pigs and ground squirrels have been put in small cages with infected rodents, left there until the latter died and kept in the uncleaned cage for several days after the death of the sick one, but in no case was the disease transmitted even under these circumstances of intimate contact. It has been shown that feeding experiments are successful in transmitting the disease. We have good reason for believing that in nature it is not ordinarily transmitted in this manner. The reason for this is the fact that in the feeding experiments the buboes of the animals infected by ingestion were in the neck or in the mesentery, while when the disease is naturally contracted by squirrels the bubo is often situated in other parts of the body, axilla, pelvis, or inguinal regions. As the most prominent feature of the disease in most naturally infected rodents is a lesion of the peripheral lymph glands, it would seem reasonable to believe that the infection usually gains entrance through the skin. The unsuccessful contact experiments, four in number, in which healthy guinea pigs were kept with sick ones and allowed to remain in the cages, some of which were very filthy by reason of the accumulation of urine and feces from the sick and the well animals, negatived the probability that the disease was transmitted by means of contact with sick animals or their excretions.

INSECT TRANSMISSION.

It is more in keeping with our present views of the transmission of many infectious diseases to look for a living carrier, and as this disease has so many points of resemblance to plague, which has been shown to be readily transmitted among rats, guinea pigs, and squirrels by means of fleas, we naturally turned to these parasites as a probable means of conveying the disease. It was found possible to reproduce the infection in guinea pigs by subcutaneous inoculation with crushed squirrel fleas (*Ceratophyllus acutus*) taken from a squirrel or from a guinea pig dead of the disease. The successful experiments were performed by inoculating the guinea pigs with fleas not more than 24 hours after removing them from recently dead rodents. The infection of the guinea pig in this manner proves nothing more than that the rodent from which the fleas were taken had a septicæmia. In one case in which 10 fleas were kept (alive) from 3 to 5 days before injecting them into guinea pigs, the animals remained well.

Attempts were made to infect guinea pigs and squirrels by placing the fleas, which had been removed from rodents recently dead of the disease, in clean cages with the healthy animals, and also by placing healthy rodents (squirrels and guinea pigs) in cages from which a squirrel dead of the disease had been removed. Large numbers of fleas (*C. acutus*) were present, but in no case did the animal contract the disease.

In two cases in which healthy squirrels were introduced into cages with sick animals and in the presence of large numbers of squirrel fleas (*C. acutus*) infection of the healthy rodents occurred; while in adjacent cages in which all conditions were the same, but no fleas present, the healthy animals remained unaffected.

Flea transfer No. 1 (November 11, 1910).—A squirrel was inoculated cutaneously with spleen from a naturally infected squirrel. Two healthy squirrels were placed in the cage with it and 100 fleas (*C. acutus*). The inoculated animal died on the sixth day. One of the contacts died on the nineteenth day with the usual lesions of the disease, the bubo being in the median inguinal region; the other died on the twenty-eighth day with a bubo in the axilla and other characteristic findings.

Flea transfer No. 2 (October 12, 1910).—A squirrel was vaccinated with the liver of a guinea pig dead of the disease. Two healthy squirrels were placed in the cage with this animal, together with about 500 squirrel fleas (*C. acutus*). The inoculated rodent died with the usual lesions 5 days after inoculation. The other squirrels both died, one 4 days and the other 7 days after the death of the inoculated one. In one the bubo was in the mesentery, in the other it was in the neck. On account of the location of the buboes, we were inclined to attribute the infection in these cases to ingestion rather than to flea transference.

GENERAL REMARKS.

The disease appears to be uniformly fatal to squirrels, guinea pigs, and mice. Although but few squirrels and mice were used, every one that was inoculated succumbed. Of the large number of guinea pigs used, but one survived the inoculation, and we are in doubt whether this was an example of defective technique, the absence of the infectious agent from the material used (vaccination with heart's blood from a guinea pig), or of a natural resistance. The disease has not been observed to follow a chronic course in guinea pigs, mice, or squirrels. The time of death and the lesions indicate that the process is an acute one. The following table shows the day of death of guinea pigs inoculated by various methods:

Day of death.	Inoculation.			
	Vaccination.	Subcutaneous.	Nasal.	Intraperitoneal.
First	0	0	0	0
Second	0	0	0	0
Third	0	1	0	1
Fourth	2	1	0	0
Fifth	11	8	0	0
Sixth	21	14	2	0
Seventh	18	10	0	0
Eighth	11	1	0	0
Ninth	3	0	0	0
Tenth	1	1	0	0
Eleventh	2	1	0	0
Twelfth	1	....	....	....

The virus has been carried through eleven generations in guinea pigs without any evidence of loss of virulence.

We do not know whether the organism causing this disease is pathogenic for man, but judging from the large number of species that are susceptible, we are inclined to suspect that man might contract the infection.

SUMMARY.

A disease which presents lesions very similar to those of plague has been found among ground squirrels.

The disease is readily transmitted to guinea pigs, mice, rabbits, monkeys, and gophers, and plague-like lesions are produced in at least some of these animals. Rats are but moderately susceptible to the infection. Cats, dogs, and pigeons appear to be immune.

The disease may be transmitted artificially by subcutaneous, cutaneous (vaccination), nasal, and intraperitoneal inoculation. The mode of transmission in nature is unknown, but there is some experimental evidence that suggests that fleas may serve as carriers. The disease probably is not spread by mere contact of healthy with infected animals.

The infectious agent has not been isolated. On account of the number of species susceptible, it seems likely that it is bacterial, not protozoan.

The causative agent is present in the circulating blood, as well as in the various tissues where it causes focal lesions.

The thermal death point of the organism as it is found in the animal's body is between 55° C. and 60° C.

Several observations appear to indicate that the disease is a febrile one.

LIST OF PUBLIC HEALTH BULLETINS.

The following is a list of the Public Health Bulletins that have been issued:

*1. Report on Trichinæ and Trichinosis. By W. C. W. Glazier. 1881. 212 pages. 87 il. 1 map. Paper. Senate Executive Document No. 9. Forty-sixth Congress, third session. Out of print.

*2. Report on the Etiology and Prevention of Yellow Fever. By George M. Sternberg. 1890. 271 pages. 21 pl. 20 il. Cloth. Out of print.

3. Mortality Statistics in the United States for the year ending December 31, 1897. From Annual Report Marine-Hospital Service, 1898. 24 pages. Paper.

4. Yellow Fever: Its Nature, Diagnosis, Treatment, and Prophylaxis and Quarantine Regulations Relating thereto. By officers of the Marine-Hospital Service. Reprint from Annual Report Marine-Hospital Service, 1898. 176 pages. 1 il. Paper.

*5. Shipment of Merchandise from a Town Infected with Yellow Fever. By H. R. Carter. 1899. 15 pages. Paper. Out of print.

6. Report of Commission of Medical Officers detailed by authority of the President to Investigate the Cause of Yellow Fever. By Eugene Wasdin and H. D. Geddings. July, 1899. 98 pages. 26 charts. 2 il. Paper.

*7. The Bubonic Plague. By Walter Wyman. January, 1900. 50 pages. Paper. Superintendent of Documents, 5 cents.

*8. Report of Commission appointed by the Secretary of the Treasury for the Investigation of Plague in San Francisco. By Prof. Simon Flexner, Prof. F. G. Novy, and Prof. L. F. Barker. January 23, 1901. 23 pages. 1 map. Paper. Out of print.

*9. Report Relating to the Origin and Prevalence of Leprosy in the United States. By a commission of Medical Officers of the U. S. Marine-Hospital Service. 1902. 119 pages. 25 il. Paper. Senate Document No. 269, Fifty-seventh Congress, first session. Superintendent of Documents. Cloth, $1.00.

*10. Plague Conference. Containing a copy of the address of the chairman, and resolutions passed by a conference called in accordance with requests from a number of State Boards of Health, and under authority of section 7, act of Congress approved July 1, 1902, to consider the plague situation. Reprint from P. H. R. No. 4, Vol. XVIII, January 23, 1903. 9 pages. And February 6, 1903. 41 pages. Paper. Out of print.

11. Transactions of the First Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1903. 120 pages. Cloth.

12. Transactions of the Second Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1904. 95 pages. Cloth.

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* Exhausted and not for distribution.

13. The Public Health and Marine-Hospital Service of the United States. A Brief History. Prepared for the Louisiana Purchase Exposition. December, 1904. 16 pages. Paper.

*14. Sanatorium for Consumptives, Fort Stanton, N. Mex. By P. M. Carrington. Reprint from Annual Report Public Health and Marine-Hospital Service, 1904. 19 pages. Paper. Out of print.

15. Transactions of the Third Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1905. 52 pages. Cloth.

16. How to Prevent Yellow Fever—No Mosquitoes, No Yellow Fever. By Walter Wyman. July 31, 1905. 3 pages. Circular.

17. Transactions of the Fourth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1906. 75 pages. Cloth.

18. Transactions of the Fifth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1907. 47 pages. Cloth.

19. Trachoma, Its Character and Effects. By Taliaferro Clark and J. W. Schereschewsky. 1907. 34 pages. 6 il. Paper.

*20. The Public Health and Marine-Hospital Service of the United States. A Brief History. Prepared for the Jamestown Ter-Centennial Exposition. 1907. 12 pages. Paper. Out of print.

21. Transactions of the Sixth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. April, 1908. 79 pages. Cloth.

*22. The Present Pandemic of Plague. By J. M. Eager. 1908. 30 pages. Paper. Out of print.

23. Pellagra—A Precis. By C. H. Lavinder. July 24, 1908. 22 pages. 1 il. Paper.

24. The Marine-Hospital Sanatorium, Fort Stanton, N. Mex. Prepared for the International Congress on Tuberculosis, held in Washington, September, 1908. 32 il. 56 pages. Paper.

*25. Hookworm Disease. Reprint from Annual Report P. H. and M. H. S., 1908. 5 pages. Paper. Out of print.

26. Studies upon Leprosy.
    I. The Present Status of the Leprosy Problem in Hawaii.
    II. The Reaction of Lepers to Moro's "Percutaneous" Test.
    III. A Note Upon the Possibility of the Mosquito Acting in the Transmission of Leprosy. By W. R. Brinckerhoff. 1908. Investigations made in accordance with the Act of Congress approved March 3, 1905. 24 pages. Paper.

27. Studies upon Leprosy.
    IV. Upon the Utility of the Examination of the Nose and the Nasal Secretions for the Detection of Incipient Cases of Leprosy. By W. R. Brinckerhoff and W. L. Moore. 1909. Investigations made in accordance with the Act of Congress approved March 3, 1905. 29 pages. Paper.

28. Studies upon Leprosy.
    V. A Report upon the Treatment of Six Cases of Leprosy with Nastine (Deycke). By W. R. Brinckerhoff and J. T. Wayson, Honolulu, T. H.

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* Exhausted and not for distribution.

28. Studies upon Leprosy—Continued.
    VI. Leprosy in the United States of America in 1909. By W. R. Brinckerhoff. 1909. Investigations made in accordance with the Act of Congress approved March 3, 1905. 25 pages. Paper.
29. The Prevalence of Rabies in the United States. By J. W. Kerr and A. M. Stimson. 1909. 16 pages. Paper.
30. The Rat and its Relation to the Public Health. By various authors. 1910. 254 pages. 60 figs. 6 pls. Paper.
    1. Introduction. By Walter Wyman.
    2. Natural History of the Rat. By D. E. Lantz.
    3. Plague Infection in Rats. By G. W. McCoy.
    4. Rat Leprosy. By. W. R. Brinckerhoff.
    5. Bacterial Diseases of the Rat other than Plague. By D. H. Currie.
    6. Organic Diseases of the Rat. By G. W. McCoy.
    7. Ecto Parasites of the Rat. By N. Banks.
    8. Intestinal Parasites of Rats and Mice in their Relation to Diseases of Man. By C. W. Stiles.
    9. Rodents in Relation to the Transmission of Bubonic Plague. By Rupert Blue.
    10. Rodent Extermination. Rats and Mice. By W. C. Rucker.
    11. Natural Enemies of Rats. By D. E. Lantz.
    12. Rat-Proofing as an Antiplague Measure. By R. H. Creel.
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    15. The Rat in Relation to Shipping. By W. C. Hobdy.
    16. The Rat as an Economic Factor. By D. E. Lantz.
    17. The Rat in Relation to International Sanitation. By J. W. Kerr.
31. Transactions of the Seventh Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1909. 86 pages. Cloth.
32. Hookworm Disease (or Ground-Itch Anemia), its Nature, Treatment, and Prevention. By Prof. C. W. Stiles. 1910. 40 pages. Paper.
33. Studies upon Leprosy. 1910. 25 pages. Paper.
    VII. A Statistical Study of an Endemic Focus of Leprosy. By W. R. Brinckerhoff and A. C. Reinecke.
    VIII. A Palliative Treatment for Leprous Rhinitis. By J. T. Wayson and A. C. Reinecke.
34. Maritime Quarantine. By L. E. Cofer. 1910. 25 figs. 64 pages. Paper.
    Appendix: Disinfectants Authorized by United States Quarantine Regulations and the Proper Method of Generating and Using Same.
35. The Relation of Climate to the Treatment of Pulmonary Tuberculosis. By F. C. Smith. 1910. 17 pages. Paper.
36. Tuberculosis: Its Nature and Prevention. By F. C. Smith. 1910. 12 pages. 1 plate. Paper.
37. The Sanitary Privy: Its Purpose and Construction. By Prof. C. W. Stiles. 1910. 24 pages. 12 figs. Paper.
38. General Observations on the Bionomics of the Rodent and Human Fleas. By M. B. Mitzmain. 1910. 34 pages. Paper.
39. Studies upon Leprosy. September, 1910. 50 pages. Paper.
    IX. Mosquitoes in Relation to the Transmission of Leprosy.
    X. Flies in Relation to the Transmission of Leprosy. By D. H. Currie.
    XI. Heredity Versus Environment in Leprosy. By H. T. Hollmann.

40. Transactions of the Eighth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. November, 1910. 101 pages. Paper.
41. Studies upon Leprosy. November, 1910. 32 pages. Paper.
    XII. Notes on the Study of Histories of Lepers from the Standpoint of Transmission. By D. H. Currie.
    XIII. A Contribution to the Study of Rat Leprosy. By D. H. Currie and H. T. Hollmann.
42. Disinfectants. Their Use and Application in the Prevention of Communicable Diseases. By T. B. McClintic. December, 1910.
43. I. Studies upon Plague in Ground Squirrels. II. A Plague-like Disease of Rodents. By George W. McCoy. February, 1911.

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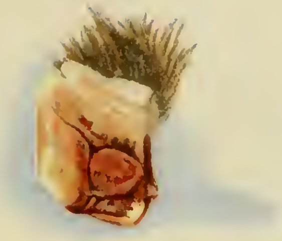

FIG. 1.—BUBO: ACUTE PLAGUE IN GROUND SQUIRREL.

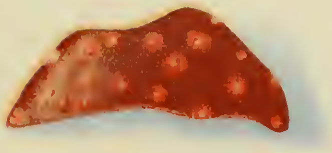

FIG. 2.—SPLEEN. SUBACUTE PLAGUE IN GROUND SQUIRREL.
SMALL CASEOUS FOCI.

H. Wyder, del.

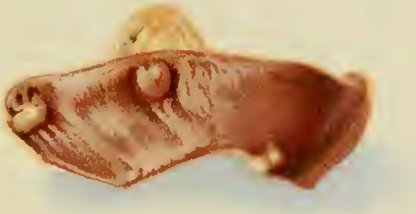

Fig. 3.—Spleen; Subacute Plague in Ground Squirrel.
large and small caseous foci.

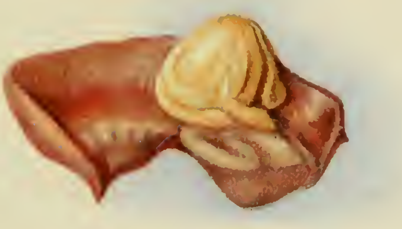

Fig 4.—Spleen; Subacute Plague in Ground Squirrel.
single large abscess

H. W[illegible] del. [illegible]

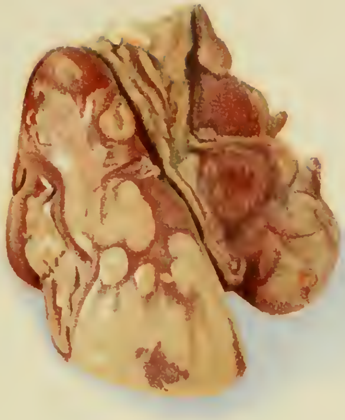

FIG. 5.—SUBACUTE PLAGUE IN GROUND SQUIRREL
DIFFUSE CONSOLIDATION OF LUNGS.

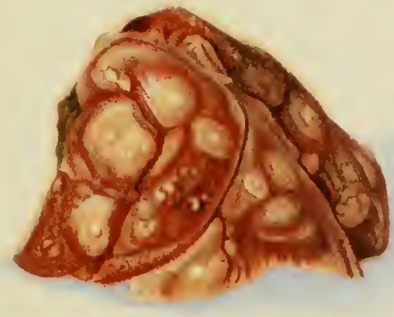

FIG 6 —SUBACUTE PLAGUE IN GROUND SQUIRREL
LARGE AND SMALL ABSCESSES IN LUNGS

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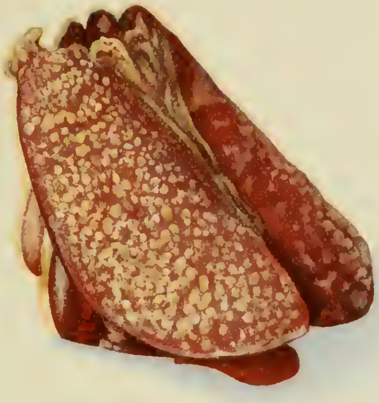

Fig 7.—Subacute Plague in Ground Squirrel
small abscesses in lungs.

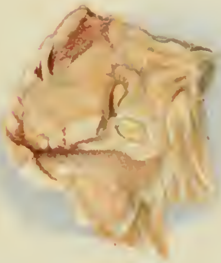

Fig 8.—Resolving Plague Bubo

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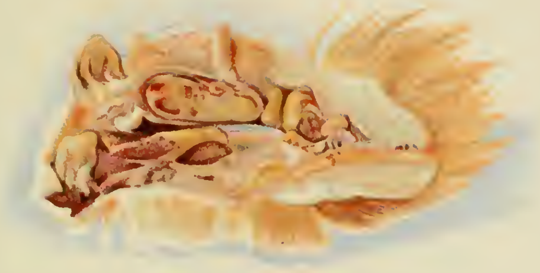

Fig. 9.—Bubo; Plague-like Disease in Guinea Pig.

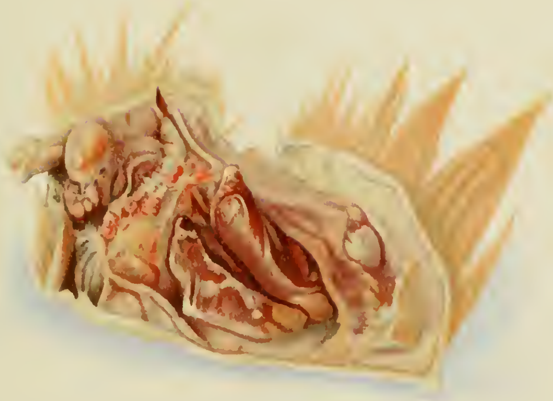

Fig 10 - Bubo, Plague in Guinea Pig

H. Wilder del.

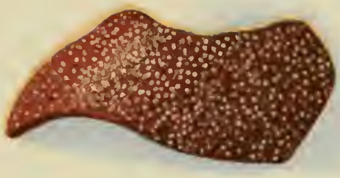

FIG. 11.—SPLEEN OF SQUIRREL, PLAGUE-LIKE DISEASE

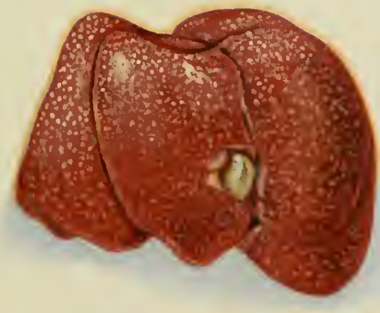

FIG. 12 – LIVER OF GUINEA PIG. PLAGUE-LIKE DISEASE

L. H Wilder, del

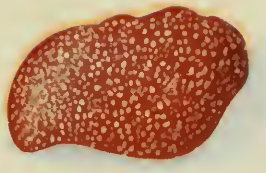

FIG 13.—SPLEEN OF GUINEA PIG. PLAGUE-LIKE DISEASE

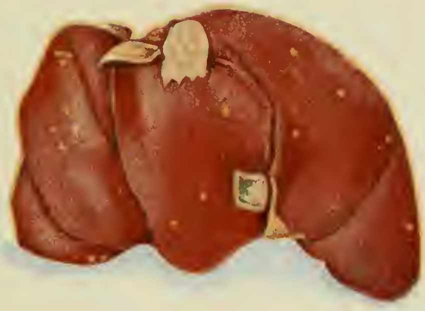

FIG 14.—LIVER OF GUINEA PIG PLAGUE

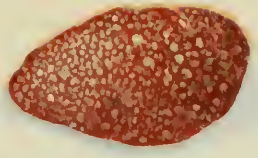

FIG. 15—SPLEEN. PLAGUE IN GUINEA PIG

L. H. Wilder del.

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TREASURY DEPARTMENT

Public Health and Marine-Hospital Service of the United States

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PUBLIC HEALTH BULLETIN No. 44

February, 1911

ACUTE ANTERIOR POLIOMYELITIS

(*Infantile paralysis*)

A PRÉCIS

CONNAUGHT LABORATORIES
UNIVERSITY OF TORONTO
Library
School of Hygiene
University of Toronto

BY

WADE H. FROST

Passed Assistant Surgeon

PREPARED BY DIRECTION OF THE SURGEON GENERAL

(SECOND EDITION)

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ACUTE ANTERIOR POLIOMYELITIS.
(INFANTILE PARALYSIS.)

By Wade H. Frost,

Passed Assistant Surgeon United States Public Health and Marine-Hospital Service.

[From the Hygienic Laboratory.]

INTRODUCTION.

Few diseases present a more complex problem than does acute anterior poliomyelitis. Eminent specialists in diseases of the nervous system, general pathology, experimental biology, orthopedic surgery, pediatrics, and epidemiology have all found in this disease special problems in their respective fields of research. The record of their special researches makes an extensive and exhaustive literature, dealing with the problem from many points of view. This literature is, however, widely scattered at present, partly because much of it is too technical to be of interest except to those engaged in some special field, partly because the bulk of the best of it is still too recent to have found its way into reference books in general use.

The object of this paper is to present, in abstract, such essential facts of the disease as may be of use, especially to the busy general practitioner to whom much of the recent literature is unavailable, to give him a general idea of the problem, and more specifically to aid him in his all-important rôle in the campaign of prevention, viz, the early recognition of cases. For those who care to go more deeply into the subject a classified bibliography is appended, referring to such of the more important special articles on various aspects of the disease as are most easily available.

For obvious reasons no attempt is made here to give a review of all the literature on the subject. Only such articles have been selected as seemed best suited, by reason of their originality, accuracy, or comprehensiveness, to the purpose of this paper.

Free use has been made of the report of the Collective Investigation Committee of New York on the epidemic of 1907,[1] the report of special investigators to the Massachusetts State Board of Health,[2] the works of Flexner and Lewis, and various other articles. I am especially indebted to Wickman's[3] extensive work, which, although written before the experimental demonstration of the infectious nature of acute anterior poliomyelitis, remains in many respects, especially in its clinical descriptions, the most comprehensive and satisfactory treatise on the subject. This work has been freely quoted and given preference over other clinical works because it is the result of the most extensive study of the disease ever made by an individual. In fact, it is doubtful if anything essential to our clinical knowledge of the disease, except statistical data and occasional reports of rare cases, has been added to Wickman's observations. Most of the reports made since his writing have been confirmations of his accuracy and comprehensiveness. A translation of Wickman's work, especially the clinical section, would be of great benefit to the physicians of the country.

SYNONYMS.

The term "acute anterior poliomyelitis," indicating as it does an acute inflammation characteristically localized in the *anterior cornua of the gray matter* of the spinal cord, is not an altogether satisfactory designation for the disease under consideration, for it has been amply demonstrated that the lesions are not confined to that area of the cord, and not necessarily confined even to the spinal cord. It is desirable, however, for the sake of uniformity and precision in mortality and morbitity reports to have one term in general use. The Bureau of the Census has experienced considerable difficulty in the compilation of mortality statistics for this disease by reason of the numerous designations employed. The returns for 1909 were received under 24 different designations.[4] The Bureau of the Census urges, therefore, with good reason, the uniform adoption of the term "acute anterior poliomyelitis." The term "infantile paralysis" is objectionable, because it is hardly applicable to adult cases; also, because it is likely to be confused with other infantile paralyses of altogether different etiology. Other terms in general use are "acute poliomyelitis," "epidemic poliomyelitis," "acute spinal paralysis," "acute atrophic spinal paralysis," "essential paralysis," and a number of other variations.

---

[1] Epidemic poliomyelitis: Report of the Collective Investigation Committee on the New York Epidemic of 1907. Nervous and Mental Diseases, monograph, series No. 6, New York, 1910.

[2] Lovett, Robt. W.: The Occurrence of Infantile Paralysis in Massachusetts in 1909. Boston Med. and Surg. Jour., 1910, vol. 163, pp. 37–55.

[3] Wickman, Ivar: Beiträge zur Kenntniss der Heine-Medinschen Krankheit (Poliomyelitis acuta und verwandter Erkrankungen). Berlin, 1907. S. Karger.

[4] Mortality statistics, 1909. Department of Commerce and Labor, Bureau of the Census, Bull. 108, Washington, 1910, p. 25.

HISTORICAL.

Acute anterior poliomyelitis is not, in any sense, a "new disease." Mitchell[1] found in the skeleton of an Egyptian mummy, dating back to 3700 B. C., evidence of probable poliomyelitis. Jacob von Heine[2] is generally credited with having given, in 1840, the first clear clinical description and differentiation of the affection. He was not, however, the first to mention the disease. Underwood,[3] in 1774, gave a recognizable, though by no means clear-cut, description; and doubtless still other references may be found in early medical literature.

EPIDEMIC PREVALENCE.

The epidemic occurrence of poliomyelitis has been recognized more recently. Colmer[4] records the occurrence of an epidemic of paralysis among teething infants in Louisiana in 1841. He did not identify the epidemic with the disease described by Von Heine. Bergenholz[5] is credited with being the first to recognize an epidemic of poliomyelitis, in 1881; his observations, however, were not published until 1890, when Medin made them known. Oxholm[6] and Cordier[7] had each in the meantime observed a small epidemic, but their publications attracted little attention until Medin[8] brought them to light in 1890, at the same time reporting his own observations on an epidemic of 43 cases which occured in and around Stockholm in 1887. Since that time epidemics have been observed with increasing frequency in various parts of the world. The largest epidemics recorded have been as follows: In Vermont, 1894, 126 cases; Norway and Sweden, 1905, about 1,500 cases; New York City and vicinity, 1907, about 2,500 cases.

From 1907 to 1910 outbreaks have occurred in the following States in this country: Connecticut, 1910; District of Columbia, 1910; Florida, 1907; Illinois, 1909; Iowa, 1908–1910; Kansas, 1909–10; Massachusetts, 1907, 1908, 1909, 1910; Michigan, 1907–8, Minnesota, 1908, 1909, 1910; Missouri (?), 1908; Nebraska, 1909; New York,

---

[1] Mitchell, J. K., Trans. Assn. Am. Physicians, vol. 15, 1900, pp. 134–136.

[2] Von Heine, Jacob, Spinale Kinderlähmung, II Aufl., Stuttgart, 1860, J. G. Cotta. (First ed. pub. in 1840.)

[3] Underwood, Michael: Treatise on the diseases of children. Phila., 1893, F. Dobson.

[4] Colmer, George: Medical Notes: Paralysis in teething children. Am. Jour. Med. Sci., 1843, vol. 5, p. 248.

[5] Cited by Medin. Verhandl. d. X. internat. med Kongr., Berlin, 1890. II Abt., VI, 1891.

[6] Cited by Leegard. Neurol. Centralblatt, 1890, p. 760.

[7] Lyon Méd., 1888, vol. 57, 5; 48.

[8] Medin. Verhandl. d. X. internat. med. Kongr., 1890. II Abt., VI, Berlin, 1891.

1907, 1910; Oregon, 1910; Pennsylvania, 1910; South Dakota, 1910; Virginia, 1908–1910; Washington, 1910; Wisconsin, 1908. Since 1907 epidemics have also occurred in Canada, in various parts of Germany and Austria, in Cuba, and in the island of Nauru, in Melanesia (1910).

Since the severe outbreak in Norway and Sweden in 1905, epidemic poliomyelitis has prevailed more widely than ever before. Whether or not this pandemic may be attributed to a spread of infection from Scandinavia is a question still open to dispute, the discussion of which is beyond the scope of this paper. Lovett's[1] compilation of the reported epidemics since 1881, is as follows:

Years.	Cases.	Outbreaks.	Average number of cases.
1880–1884	23	2	11.5
1885–1889	93	7	13
1890–1894	151	4	38
1895–1899	345	23	15
1900–1904	349	9	39
1905–1909	8,054	25	322

These figures show very strikingly the enormous increase in the epidemic prevalence of poliomyelitis from 1905 to 1909. There is good reason to believe that there has been a corresponding increase during the same period, in so-called "sporadic" cases—cases which are not recognized as occurring in connection with any well-defined epidemic. This is inferred from hospital reports, showing a large increase in the number of patients admitted for treatment for the resulting paralysis, in districts where no epidemic has been reported.

Lovett calls attention to the fact that the United States has suffered more severely than any other country, being credited with some 5,500 of the 8,000 cases reported from 1905 to 1909. It will be noted, too, that the great majority of epidemics in the United States have occurred in the northern States, east of the Dakotas. While reports for 1910 are as yet incomplete, it may safely be asserted that the prevalence of the disease has very considerably increased during this year, in respect both to the number of persons attacked and the area over which the epidemics have occurred.

According to the statistics of the Census Bureau,[2] there were 569 deaths from acute anterior poliomyelitis in the registration area of the United States in 1909. The population from which these statistics are collected represents 55.3 per cent of the total population of the United States. The 569 deaths reported are from 33 States, and do not include a considerable number of deaths in nonregistration States, notably in Minnesota and Nebraska.

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[1] Lovett, Robt. W., Bost. Med. and Surg. Jour., July 14, 1910, vol. 163, No. 2, pp. 37–55.

[2] Mortality statistics, 1909. Department of Commerce and Labor, Bureau of the Census, Bull. 108, Washington, 1910, pp. 24–26.

DEVELOPMENT OF KNOWLEDGE CONCERNING EPIDEMIC POLIOMYELITIS.

It naturally follows that the increased prevalence of epidemic poliomyelitis, with the consequent stimulation of interest therein, should have resulted in many valuable additions to our knowledge of the subject.

Pathology.—Jacob von Heine,[1] as above stated, first gave a clear-cut clinical description of acute anterior poliomyelitis in 1840. Prevost and Vulpian,[2] in 1865, are credited with having given the first anatomical demonstration of the destruction of the ganglion cells of the anterior cornu in poliomyelitis. The clinical studies of Von Heine and the pathological studies of Prevost and Vulpian both dealt with the late manifestations of the disease as seen subsequent to the acute stage. Roger and Damaschino,[3] in 1871, reported the first pathological study of a cord from a case in the acute stage; and first recognized interstitial changes as the *primary* lesions of acute poliomyelitis. From that time ensued a running fight among pathologists in regard to pathogenesis, one school holding the essential acute lesion to be specific intoxication of the motor cells of the anterior cornu, the interstitial changes being of secondary importance. The other school deemed the primary essential lesion in the acute stage to be a diffuse myelitis, resulting secondarily in degenerative changes of the motor ganglion cells. With the increase of the epidemic prevalence of poliomyelitis and the increased opportunities for the study of material obtained from recent acute cases, it has become more and more evident that the views of the latter school were correct; and it is now generally recognized that the acute nervous lesions of poliomyelitis are interstitial and widespread throughout the cerebrospinal axis. While many pathologists have had a part in this demonstration, special credit should be given to Wickman[4] and to Harbitz and Scheel.[5]

Symptomatology.—Parallel with the development of knowledge of the pathology of the disease has been the development of the knowledge of its clinical manifestations. Medin,[6] in 1890, gave the first comprehensive account of the symptoms of the acute stage from observations of an epidemic in Stockholm in 1887. He was the first to call attention forcibly to the varied clinical manifestations of the acute stage, indicative of changes in all parts of the nervous system.

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[1] Von Heine, Jacob. Spinale Kinderlähmung.

[2] Prevost and Vulpian: Observation de la paralysis infantile. C. R. de la Soc. de Biol., 1865. Paris, 1866, 4 s., ii, pp. 215–218.

[3] Roger and Damaschino: Recherches anatomo-pathologiques sur la paralysie spinale de l'infance. C. R. de la Soc. de Biol., 1871. Paris, 1873, 5 s., iii, pt. 2, pp. 49–93.

[4] Wickman, I.: Studien über Poliomyelitis actua. Arb. aus d. Path. Inst. d. Univ. Helsingfors, 1905–1907. Berlin, 1907, S. Karger, pub.

[5] Harbitz u. Scheel: Pathologisch-anatomische Untersuchungen über akute Poliomyelitis u. verwandter Erkrankungen. Christiania, 1907, A. W. Broggers, pub.

[6] Medin, loc. cit.

although Strümpell[1] and Pierre-Marie[2] had previously noted the occurrence of encephalitis in acute poliomyelitis, and others had, in a less comprehensive manner than Medin, noted many of the facts which he first put together so clearly. In view of the pioneer services of von Heine in describing the later stages and of Medin in describing accurately the acute stage, Wickman has suggested the name "Heine-Medin disease" for acute poliomyelitis, since pathological designations (acute anterior poliomyelitis, acute poliomyelitis, epidemic poliomyelitis, epidemic spinal paralysis, infantile paralysis, poliomyelo-meningo-encephalitis) are either misnomers or overcumbersome. The most valuable clinical contribution since Medin's has been made by Wickman, whose special service in this respect has been the recognition of abortive forms of the disease, and the presentation of the whole subject from a broader, more comprehensive point of view than any of his predecessors.

Epidemiology.—The recognition of the epidemic occurrence of the disease has already been referred to as dating from the observations of Bergenholz, in 1881. While many observers since Bergenholz have reported epidemics of acute poliomyelitis, and in many cases have gone more or less into the question of the origin and transmission of the epidemics, the first systematic study from an epidemiologic point of view was undertaken by Wickman in Sweden in 1905–6. He personally investigated over 1,000 cases, attempting to trace the routes by which the disease spread. He found abundant evidence to show that it was contagious, though usually slightly so. He directed especial attention to several factors in its spread—routes of travel, public gatherings of children (schools), abortive (ambulant) cases, and healthy intermediate carriers. Since that time systematic epidemiologic investigations have been undertaken by the Governments of several foreign countries; and in this country by several States, notably Massachusetts, Minnesota, Nebraska, Kansas, and Iowa. A committee of the New York Neurological Society investigated and has recently reported upon the New York epidemic of 1907. The reports of the New York investigation committee and of the Massachusetts State Board of Health are especially valuable, on account of their comprehensiveness and thoroughness.

Experimental poliomyelitis.—The most recent development of knowledge concerning epidemic poliomyelitis is derived from the study of the disease experimentally produced in monkeys. It had been recognized for some years prior to 1909 that acute poliomyelitis must be due to some specific infection; and quite a number of observers had isolated from the nervous system of patients suffering from the disease bacteria which they believed to be the specific causative agent. Some observers claimed to have reproduced the disease in lower animals by injections of pure cultures of such bacteria. However, the bacteria found by different observers belonged to different species; many competent bacteriologists constantly failed to find any bacteria whatsoever, and the lesions occasionally produced in lower animals did not correspond to the lesions of human poliomyelitis. Consequently, none of the above claims were generally accepted. In the spring of 1909, Landsteiner and Popper [1] succeeded in transmitting the disease to two monkeys by inoculation with the spinal cord of a child which had died of acute poliomyelitis. The lesions found in the cords of these monkeys were typical, but Landsteiner and Popper failed in their attempts to transmit the disease from these to other monkeys. Later in the year Flexner and Lewis [2] succeeded in confirming the work of Landsteiner and Popper, and further succeeded in transmitting the infection from monkey to monkey through an indefinite number of passages. Since then a great deal of very brilliant experimental work has been done upon this subject by Flexner and Lewis, Römer and Joseph, Landsteiner and Levaditi, Leiner and Weisner, Krause and Meinecke, R. Kraus, and others.[3]

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[1] Strümpell, Jahrb. f. Kinderheilk., 1885.

[2] Pierre-Marie, Progrès méd., 1885, II, s., II, 167–169.

ETIOLOGY.

THE SPECIFIC ORGANISM.

The proof that the causative agent of epidemic poliomyelitis is a *living organism* is furnished by its demonstrable multiplication or *reproduction* in the body of an inoculated animal, reproduction being a property confined to living organisms. A comparatively small amount (0.5 c. c. of a 5 per cent emulsion) of the spinal cord of a person who has died of epidemic poliomyelitis, injected into the brain of a monkey, is sufficient to produce the disease in this animal after an incubation period of 5 to 46 days. This effect might be ascribed to the action of either a living organism, capable of multiplication or a chemical poison (toxin). In the latter case, the toxin must undergo great dilution, since portions of the central nervous system of this animal, remote from the site of inoculation, have been found capable of reproducing the disease in other monkeys. After a very few such passages the amount of toxin contained in, say, 1 gram of the spinal cord would be inconceivably small, and the potency of the cord in causing the disease proportionately diminished. As a matter of fact, Flexner and Lewis [4] have succeeded in transmitting the disease through a series of at least 25 monkeys, using at times quantities of the virus as small as 0.01 c. c. to 0.001 c. c.

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[1] Landsteiner, K., and Popper, E. Zeitschr., f. Immunitätsforsch, usw., Orig., 1909, vol. 2, p. 377.

[2] Flexner, S., and Lewis, Paul A., Jour. Am. Med. Assn., 1909, vol. 53, p. 1639.

[3] The more important works of all these authors are cited by Lovett in Boston Med. and Surg. Jour., vol. 163, 1910, pp. 37–55, and by Landsteiner and Levaditi in Ann. de l'Inst. Pasteur, vol. 24, 1910, pp. 833–876.

[4] Flexner, S., Journ. Am. Med. Assn., vol. 55, pp. 1105–1113.

From one monkey, inoculated with a minimal dose of the virus, enough virus can be obtained to reproduce the disease in *several hundred* monkeys. The multiplication of the virus in 25 passages is, therefore, enormous.

In spite of the fact that this organism can not be isolated in pure culture, as can the bacteria, a great deal of quite definite knowledge concerning it has already been acquired by the work of the above-mentioned observers.

It is known to be an exceedingly small organism, because emulsions of virulent spinal cord are still infective after filtration through very dense porcelain (Chamberland) filters, the pores of which are so small that even very minute *bacteria* can not pass through. The organism belongs, therefore, to the class of so-called "filterable viruses," other examples of which are the organisms of yellow fever, rabies, the foot-and-mouth disease of cattle, probably hog cholera, and others.

It is not visible in preparations made by the usual bacteriologic methods, but is thought to have been seen with high-power lenses in preparations very carefully stained; also unstained, by the use of dark-background illumination. It will not grow upon the ordinary culture media in general use for cultivating bacteria, but will probably multiply to a slight extent in ascitic bouillon. Such cultures have been successfully transplanted, but are not virulent and are of little practical value in experimental studies.

The virus of poliomyelitis is killed by a temperature of 45°–50° C. in half an hour; also, by comparatively weak disinfectants, such as 1:500 solution of permanganate of potash;[1] 1 per cent menthol in oil;[1] a powder containing menthol 0.5, salol 5, and boric acid 20;[1] a dilution of perhydrol (Merck) equivalent to 1 per cent of peroxide of Hydrogen.[2, 3]

It is not destroyed by very low temperatures nor by drying over caustic potash or in vacuo for a considerable period. A virulent cord has been kept for almost five months in pure glycerin without losing its virulence, resembling in this respect the virus of rabies, vaccine, etc., and differing from nonspore-bearing pathogenic *bacteria*, which are, for the most part, killed by pure glycerin in a short while.

As is to be expected, the organism is present in greatest abundance in the spinal cord of infected persons and animals, as shown by the extremely small amounts of these organs necessary to infect a monkey by inoculation (0.001 c. c. to 0.01 c. c. of an emulsion of cord—Flexner). It is also, however, quite constantly present in the brain and has been demonstrated in various other organs of infected animals, viz, in the mucous membrane of the nose and pharynx, the salivary glands, the mesenteric glands, the regional (axillary or inguinal) lymph glands after subcutaneous inoculation, in the blood, and in the cerebro-spinal fluid. In the blood, however, the virus appears to be present in small quantity and only in the early stages of the disease, and the same may be said of the cerebro-spinal fluid. No one has yet succeeded in demonstrating the presence of the virus in the urine or feces, though it is suspected, from the pathology of the disease, that the feces may be infectious, and technical difficulties may explain the failure to demonstrate this.

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[1] Landsteiner, K., and Levaditi, C., Ann. de l'Inst. Pasteur, 1910, vol. 24; pp. 833–876.

[2] Flexner, S., and Lewis, Paul A., Journ. Am. Med. Assn., vol. 56, 1910, p. 1782.

[3] The ordinary commercial preparation of hydrogen peroxide contains about 3 per cent of the peroxide (H_2O_2). Perhydrol (Merck) contains about 30 per cent H_2O_2.

The most uniformly successful method of inoculating monkeys is by injecting an emulsion of infectious material directly into the central nervous system, preferably into the brain. Monkeys may also be infected by subcutaneous, intraperitoneal and intravenous inoculation, by rubbing virulent material into the scarified mucous membrane of the nose, by transplantation of infectious tissue into the trachea, and by introducing the virus into the stomach along with an opiate to restrain peristalsis. Leiner and Weisner[1] have infected monkeys through the *uninjured* nasal mucous membrane. This is, however, an uncertain method of inoculation, as other observers have failed in their attempts to reproduce the disease in this way. Monkeys have so far never been known to contract the disease spontaneously from intimate association with infected monkeys.

Numerous attempts have been made to transmit the disease to lower animals other than the monkey, viz, to guinea pigs, rabbits, horses, sheep, hogs, dogs, cats, chickens, ducks, and pigeons. These animals have all been found insusceptible, with the exception of certain breeds of rabbits. Krause and Meinicke[2] were the first to report the successful inoculation of rabbits from human material, and subsequent transmission from rabbits to other rabbits and to monkeys. Their results have been confirmed to some extent by other workers[3] who have succeeded in producing in a comparatively small proportion of rabbits inoculated, a disease which has more or less clinical resemblance to acute poliomyelitis. Landsteiner and Levaditi[3] found in the cord of one of their rabbits lesions similar to those found in man and in the monkey. Others have failed to find such lesions; and indeed the great majority of attempts to inoculate rabbits have proved unsuccessful. The question of the susceptibility of rabbits to human infection has not been sufficiently cleared up to warrant very definite conclusions. It appears, however, that they are at least very much less susceptible than monkeys.

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[1] Leiner, C., and Weisner, R. v., Wien. klin. Wochenschr., 1910, vol. 23, p. 323.

[2] Krause, R., and Meinicke, E., Deutsche med. Wochenschr., 1910, vol. 35, p. 647; ibid., 1910, vol. 35, p. 1825.

[3] Beneke, Münch. med. Woch., 1910, vol. 57, pp. 176–178; Kraus, R., Med. Klin., 1910, vol. 6, pp. 470–472; Landsteiner, K. and Levaditi, C., Ann. de l'Inst. Past., 1910, vol. 24, pp. 833–876; Bonhof, Münch. med. Woch., 1910, vol. 57, p. 105; Dahm, Münch. med. Woch., 1909, vol. 56, p. 2553; Lentz and Hüntemuller, Tag. der fr. Verein. Mikrobiol., Berlin, 1910 (cited by Landsteiner and Levaditi, supra).

IMMUNITY.

Monkeys which have recovered from the infection of poliomyelitis show a definite immunity, demonstrable in two ways: (1) They are not susceptible to infection by reinoculation, and (2) their blood serum, when mixed in suitable proportions with an emulsion of virulent spinal cord and allowed to stand for several hours, renders the virus harmless. This property has also been demonstrated in the blood of persons who have recovered from poliomyelitis, but is not shown by the blood of normal persons and of normal monkeys.

The immunity is probably very lasting. The neutralizing power of the blood has been shown to last for 3 years after an attack of poliomyelitis, but was found absent in one case tested 11 years after the acute attack.[1] A second attack of the disease is rare, but a few instances have been reported of recurrence after the lapse of several years.

It has not been found possible as yet to obtain from immunized animals a serum which will arrest the progress of the disease after it has developed. While the hope of such a serum may still be held out as a possibility, its usefulness would necessarily be limited to the treatment of the early stages of the disease, before destruction of nerve centers had taken place. Attempts to actively immunize (vaccinate) monkeys have, in some instances, been successful, but no method has yet been developed which may safely be applied to human beings.

CONTAGIOUSNESS.

It has been experimentally demonstrated that the *mucous membrane* of the nose of infected monkeys is infectious, and in one case the salivary glands;[2] and it has been quite reasonably inferred therefrom that the *secretions* of the nose and mouth are infectious, although experiments aiming to demonstrate the latter have failed.[3] It has also been shown that infection may take place through the mucous membrane of the respiratory and digestive tracts.

These facts indicate very strongly that the disease is transmissible directly from person to person by direct contact, a conclusion which

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[1] Netter, A., and Levaditi, C., Comp. rend. de la Soc. de Biol. 1910, vol. 68, pp. 855–857.

[2] Landsteiner, K., and Levaditi, C., Comp. rend. de la Soc. de Biol. 1909, vol. 67, p. 788.

[3] Landsteiner, K., and Levaditi, C., Comp. rend. de la Soc. de Biol. 1909, vol. 67, p. 788. 833–876.

Wickman had already reached from his epidemiologic studies. Others have reached varying conclusions from the study of epidemics, some asserting that there was no evidence that contact with the sick played any rôle in the transmission of the disease, some considering its contagiousness established. While it is beyond the scope of this paper to discuss in detail the evidence for and against the contagiousness of epidemic poliomyelitis, it may be said that the best evidence at present available indicates that the disease is *transmissible* from person to person, probably by direct contact. It must be usually rather slightly transmissible, since only a small proportion of persons in intimate contact with cases contract the disease. Under some circumstances, however, it appears to be rather highly contagious, affecting a very considerable proportion of the population of a limited area. Examples of seemingly quite contagious epidemics are reported by Wickman, from Traestena, Sweden; by Shidler,[1] from Polk County, Nebr.; and by Armstrong,[2] from North St. Paul, Minn. The writer investigated a small, apparently highly contagious outbreak among the attendants of a rural school in Hancock County, Iowa, in the summer of 1910, details of which will be given in a later publication.

OTHER ETIOLOGICAL FACTORS.

It is evident that certain predisposing factors are operative in causing infection, either by increasing the susceptibility of persons exposed, by increasing the virulence of the infecting organism, or by facilitating its transmission.

Geographic distribution.—Epidemics of poliomyelitis have been most prevalent in the northern parts of Europe and of the United States, and, more recently, also in Canada. The disease has not been confined to these countries, however. Epidemics have occurred in southern Europe (Italy) and in the southern part of the United States (Alabama, South Carolina, and Virginia); a considerable epidemic occurred in Cuba in 1909. There have been several epidemics in Australia, and during January, 1910, a very remarkable epidemic on the little island of Nauru, situated near the Equator, north of Australia. There are, therefore, no well-defined geographic limits to the area within which acute poliomyelitis has been known to become epidemic. Sporadic cases, not known to be connected with epidemic outbreaks, have occurred over a still wider area.

The occurrence of epidemics in various places has not been proportional to their geographic proximity to recognized previous epidemic foci, nor has it apparently been proportional to the amount of travel from such foci. It appears, however, that sporadic cases are unusually prevalent along routes of travel leading from epidemic foci.

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[1] Shidler, G. P., Pediatrics, vol. 22, 1910, pp. 539–543.

[2] Armstrong, J. M., Pediatrics, vol. 22, 1910, pp. 486–501.

Density of population.—The occurrence and spread of epidemic poliomyelitis is not proportional to the density of population. On the contrary, epidemics have been more severe and the case rates have been higher in small towns and rural districts than in the more densely populated cities, and in cities the disease has not been found more prevalent in the crowded districts.

Climate.—The countries which have suffered most have been those with a cold climate, showing marked seasonal variations in temperature, but striking exceptions to this have been noted above.

Season.—Epidemics of acute poliomyelitis occur almost invariably in the warm, dry months—in the Northern Hemisphere from May to November; in the Southern Hemisphere from November to May. Sporadic cases occur, however, throughout the year, and warm weather need not therefore be considered a *necessary* factor in infection.

Age.—The proportion of cases decreases progressively in each decade after the first. The proportion of adult cases, however, may be considerable in epidemics. The great variations in the age incidence in different epidemics are illustrated in the following tables, the first of which is arranged in three-year periods, in order to include Wickman's statistics, while the second is arranged in the more usual five-year periods. The majority of cases are in children between 1 and 5 years of age.

THREE-YEAR PERIODS.

Ages.	Reported by—							
	Collective investigation committee, New York (1907).		Lovett, Massachusetts (1909).		Hill, Minnesota (1909).		Wickman, Sweden (1905).	
	No. of cases.	Per cent of total.	No. of cases.	Per cent of total.	No. of cases.	Per cent of total.	No. of cases.	Per cent of total.
0-2, inclusive	463	63.5	258	41.9	89	27.4	169	19.5
3-5, inclusive	197	27.0	182	29.6	90	27.7	181	21.1
6-8, inclusive	40	5.5	70	11.4	53	16.3	154	17.6
9-14, inclusive	21	2.9	57	9.3	47	14.5	165	19.0
15 and over	8	1.1	48	7.8	46	14.2	199	22.9
Total cases	729	....	615	....	325	....	868	....

FIVE-YEAR PERIODS.

Under 1 year	62	8.5	41	7.2	21	6.5	....	....
1-5 years	598	82.0	396	64.5	158	48.6	....	....
6-10 years	47	6.4	98	15.9	77	23.7	....	....
11-15 years	14	1.9	31	5.0	25	7.7	....	....
16-20 years	5	.68	15	2.4	21	6.5	....	....
Over 20 years	3	.40	31	5.0	23	7.0	[1] 87	[1] 10.0
Total cases	729	....	615	....	325	....	868	....

[1] Wickman's figures are given only in three-year periods and are therefore available only for the last column of this table.

The New York epidemic of 1907 is characterized by the large percentage of cases occurring in childhood (90.5 per cent in the first six years) while the Swedish epidemic of 1905 stands at the other extreme, with only 40.6 per cent of cases in the first six years, and 10 per cent among *adults*. The epidemics in Massachusetts and Minnesota are intermediate between these two extremes, the Minnesota statistics approximating more closely those from Sweden.

The generalization seems warranted that in epidemics affecting a comparatively large proportion of the population in a given area the proportion of adult cases is high. In the very remarkable epidemic of 1910 on the island of Nauru, where 700 cases occurred within a few weeks in a population of little over 2,500, the majority of cases were in adults.[1]

Sex.—More males are affected than females. In Massachusetts in 1909, the ratio was males, 363; females, 263; in Minnesota in 1909, males, 193; females, 139. As shown by Hill[2] in his analysis of the Minnesota cases, the proportion of males and females affected is more nearly equal in the first decade of life, while after 10 years of age males are affected in much greater proportion than females.

Race.—There is little to indicate that nationality has any influence upon susceptibility. In the New York epidemic of 1907, there were proportionately fewer cases among the negroes than among white races. Upon the island of Nauru the population and attack rate are given as follows:

	Number of persons.	Number of cases.	Number of cases per 1,000.
Natives	1,250	470	376
Imported laborers[1]	1,000	220	220
Whites	80	3	37.5

[1] Partly Chinese and partly Caroline Islanders.

The death rate among the natives was 7.8 per cent, while among the imported laborers it was 0.45 per cent, and among the whites (3 cases) there was no mortality. There was, therefore, in this instance, apparently a very marked difference in racial susceptibility; but this epidemic was so remarkable in many other respects that it can not be taken as illustrative of epidemic poliomyelitis in general.

The high death rate and large proportion of adult cases in Norway and Sweden arouse a suspicion that the Scandinavians may be peculiarly susceptible. In this connection it may be noted that in the

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[1] Müller, A., Arch. f. Schiffs-u. Trop.-Hyg., 1910, vol. 14, No. 17.

[2] Hill, H. W.: Epidemiologic study of anterior poliomyelitis in Minnesota, Trans. Section on Preventive Med., Amer. Med. Assn., 1910.

United States the most fatal and most infective epidemics have occurred in the Middle West and Northwest, where a large proportion of the population is of Scandinavian descent. On the other hand, it has not been shown that an undue proportion of Scandinavians have been attacked, even in the Northwest. The question of difference in racial susceptibility is therefore still an open one.

Social and hygienic conditions.—Poverty and insanitary conditions of life seem to have little, if any, influence in determining infection. All classes are affected in about equal proportions.

PATHOLOGY.

A widespread misunderstanding of the pathologic anatomy of acute poliomyelitis has contributed largely to a very prevalent misconception of its symptoms. The earlier pathologic studies were made chiefly on cases that had long since passed the acute stage. The most characteristic lesion observed in such cases is degeneration of the motor cells in the anterior cornua of the cord, and this was therefore naturally regarded as the essential *primary* lesion of the disease. Although for the past 20 years there has been ample evidence, both clinical and anatomical, that in the acute stage the characteristic lesion is an *interstitial inflammation*, *not confined to the motor area of the cord*, and although these facts have been published in many reference books, still the conception of the disease as essentially an inflammatory degeneration of the motor cells of the cord, has remained fixed in the minds of many of the medical profession, and statements to this effect remain in a considerable proportion of recent textbooks on the practice of medicine. The result is that those who are without experience in epidemics of the disease are unprepared to recognize as characteristic of it such nervous symptoms as are not referable to damage of the *motor cells* of the cord. In order to understand the symptoms observed, it is necessary to have at least a general knowledge of the anatomic lesions to which the symptoms are due.

Acute anterior poliomyelitis must be recognized as a general infection producing characteristic lesions in the central nervous symptoms, viz, *congestion*, *infiltration and edema of the cord*, *brain*, *and leptomeninges*.

MENINGES.

The dura mater is practically unchanged. The pia-arachnoid throughout the cerebrospinal axis shows quite constant and characteristic changes in the acute stage. The vessels are congested and their sheaths infiltrated with round cells. Between the vessels the infiltration is more diffuse. The round cells are mostly mononuclear.

No exudate is found on the surface of the meninges, which to the naked eye appear normal or simply congested. The infiltration of the pia mater varies at different levels; it is most intense in the lumbar region, where it is equally marked around the whole circumference of the cord. In the higher segments the infiltration of the pia mater is most marked over the anterior surface of the cord, and may be quite irregular in its distribution.

It is believed that the meninges are the seat of the earliest changes in the central nervous system; that the virus first invades the leptomeninges, and extends thence, following the vascular prolongations of the pia, into the substance of the brain and cord.

CEREBRO-SPINAL FLUID.

Corresponding to the changes in the meninges, there are characteristic changes in the cerebro-spinal fluid. It is increased in quantity quite early, before the onset of definite symptoms. At this time the fluid is opalescent, due to an increase in the number of cells; the protein is increased, and the fluid may coagulate spontaneously. The cellular elements are chiefly lymphocytes, although in the earlier stages there may be a large proportion of polymorphonuclear leucocytes. By the time paralysis has developed the cerebro-spinal fluid has returned more nearly to the normal; it is now clear, but still more or less increased in quantity, and still contains an abnormal number of lymphocytes.

CORD.

The early changes in the cord are congestion, round-cell infiltration, and edema. All *the vessels of the cord* are congested, and their sheaths show an infiltration of round cells similar to and continuous with the perivascular infiltration of the pia mater. In the *gray matter*, more especially in the anterior cornua, at the level of the cervical and dorsal enlargements, in addition to the infiltration immediately around the vessels, there is a more diffuse infiltration, with here and there foci of closely packed round cells. Hemorrhages, due to the rupture of small blood vessels, are quite commonly found in the gray matter and less frequently in the white substance. The infiltration is all of vascular origin, and its distribution in various areas of the cord is proportional to the vascularity of these areas. Because of a richer blood supply, the gray matter is more affected than the white, the anterior cornua more than the posterior, and the cervical and lumbar enlargements more than the other segments of the cord. The irregular distribution of the paralysis probably depends to some extent upon irregularities in the blood supply of the cord.

The ganglion cells of the cord suffer more or less secondary damage, which is generally proportionate to the infiltration around them.

The most common and extensive damage occurs in the motor nerve cells situated in the anterior cornua, especially in the lumbar and cervical enlargements, where, as already noted, the infiltration is most intense; but considerable damage, and even destruction, of some of the ganglion cells in the posterior horn, especially in Clark's column, is not uncommon. In the lumbar cord, according to Wickman, the posterior cornua show quite as extensive lesions as the anterior cornua. The damage to the ganglion cells may result in temporary loss of function, perhaps due to edema, without demonstrable changes in the cell; in partial but not permanent degeneration of the cells, or in the complete destruction of a part or all of the cells in a given area of the cord. Complete destruction of the ganglion cells of the anterior cornua in a segment of the cord results in permanent motor paralysis and atrophy of the muscles *supplied* by these neurons. The less severe cell changes result in paresis or temporary paralysis of the corresponding muscles.

The *white substance* of the cord undergoes less severe changes than the gray matter, but constantly shows infiltration of the vessel walls, edema, occasional small hemorrhages and rarely definite foci of round-cell infiltration. The acute inflammatory lesions of the white substance of the cord are important to bear in mind as explanatory of some of the symptoms in the acute stage. The rarer, more permanent lesions found here may explain some unusual motor disturbances (ataxia, exaggerated reflexes, spasticity) occasionally encountered.

SPINAL GANGLIA.

The intervertebral ganglia have been found to show changes similar to those in the cord, viz., infiltration, and degeneration of ganglion cells and nerve fibers (Straus, Flexner).

PERIPHERAL NERVES.

The peripheral nerves have not been examined as carefully as the spinal cord, but it is believed that they show no acute inflammation, except perhaps near their emergence from the spinal cord.

MEDULLA.

In the medulla oblongata and pons cerebri there are found edema and perivascular infiltration as in the spinal cord; and also, not infrequently, foci of round cells. Infiltration around the nuclei of the cranial nerves explains the cranial-nerve paralysis often noted in acute poliomyelitis. The ganglion cells in the foci of infiltration are more or less damaged; but as the foci are usually small, the complete destruction of a bulbar nerve center is rather rare.

CEREBRUM.

Changes in the brain similar to those in the cord, but less intense, are a constant characteristic of acute poliomyelitis. Severe lesions of the cerebral cortex or the conducting paths therefrom are rare, but may occur.

OTHER ORGANS.

The lesions outside the nervous system are not characteristic and are apparently not constant. In quite a number of autopsies, however, lesions have been found indicative of acute general infection, affecting especially the digestive and respiratory tracts and the lymph glands, viz., congestion of the mucous membrane of the small intestine and sometimes of the stomach; congestion and enlargement of the solitary follicles, Peyer's patches and mesenteric glands; less commonly a more general glandular enlargement; occasional pneumonic foci in the lungs; congestion of the liver and spleen, with occasional enlargement of the latter; congestion and sometimes beginning parenchymatous degeneration of the kidneys.

THE BLOOD.

The characteristic blood changes in the acute stage are diminution of the total number of white cells (leucopenia) with relative increase in the proportion of *lymphocytes*. More observations are needed to fully establish the constancy and degree of these changes.

SYMPTOMATOLOGY.

As is to be expected from its patholgy the symptoms of acute poliomyelitis are most diverse. Broadly speaking, they are the symptoms which may be expected from—

(1) An acute general infection.

(2) An acute inflammation affecting the leptomeninges and medullary substance of the brain and cord. The nervous symptoms are first those of irritation, followed in more severe cases by symptoms of depression, and in typical cases by loss of function of certain areas of the central nervous system. The irritative symptoms, arising from inflammatory lesions of comparatively mild degree but wide extent, are usually both sensory and motor; predominantly spinal, but to some extent bulbar and cerebral. The depression and loss of function resulting from more intense inflammatory changes, characteristically localized in the anterior cornua of the cord, are motor.

Of a disease embracing such a variety of symptoms it is impossible to give a single, clear-cut, clinical picture. Wickman has differentiated eight clinical types, and as later observations have confirmed his classification, it will be adopted and followed as closely as consistent with the scope and purpose of this paper. Wickman's types of acute poliomyelitis are as follows:

I. The *spinal poliomyelitic* type, characterized by onset with fever, gastro-intestinal disturbances or angina, headache, pain, often rigidity of the neck and spine, and pains in the extremities of varying intensity and distribution. From one to six days after the onset of the febrile symptoms there develops a paralysis which has certain distinctive characteristics, viz, it is a flaccid, motor paralysis. It is sudden in its onset, reaching its height within a few days, after which it shows a regression in extent, the final result being usually a permanent paralysis of considerably less extent than in the acute stage, although complete recovery may take place. This is the most common and easily recognized form of acute anterior poliomyelitis.

II. The *ascending* or *descending* type of paralysis runs the clinical course of a *Landry's paralysis*. Beginning usually in the lower extremities, the paralysis ascends until it involves, in some instances, the whole of the body; such cases usually terminate fatally from respiratory paralysis. In rare cases the paralysis is descending instead of ascending.

III. The *bulbar* or *pontine* form is characterized by paralysis of muscles supplied by cranial nerves (having their nuclei in the medulla or pons).

IV. The *encephalitic* type is distinguished by paralysis due to lesions in the motor area of the brain, resulting in a spastic monoplegia or hemiplegia. This is the rarest type.

V. In the *ataxic* type the characteristic motor disturbance is an acute ataxia, with or without paralysis.

VI. The *polyneuritic* type gives a clinical picture closely resembling multiple neuritis.

VII. The *meningeal* type includes (1) cases which in their onset are characterized by marked symptoms of meningitis, but which result in spinal or bulbar paralysis; and (2) cases in which the symptoms of meningitis are not followed by paralysis.

VIII. Abortive types include cases showing the initial symptoms of acute poliomyelitis, but not followed by paralysis.

The differentiation of these types depends upon the localization of the lesions in the central nervous system. The initial symptoms, before definite localization has taken place, are in a general way similar in all the types.

INCUBATION.

The incubation period of acute poliomyelitis has been found to vary from 3 to 46 days in monkeys experimentally inoculated, the more common period being from 7 to 15 days. The length of incubation in persons has not been definitely determined. Approximately 2 to 10 days has been generally accepted as the most usual period, but apparently great variations occur, the period being sometimes prolonged to 3 weeks or more.

INITIAL SYMPTOMS.

Definite prodromal symptoms are relatively rare. In some cases malaise, weakness, digestive disturbances (nausea, constipation, or diarrhea), angina or restlessness precede by several days the definite onset of the acute febrile stage. Bronchitis and coryza more rarely precede an attack of acute poliomyelitis—probably not more often than may be ascribed to coincidence.

Sometimes the disease develops in two stages. After slight, indefinite prodromal symptoms, the patient apparently recovers completely in a few days, and with no suspicion of a serious illness, returns to the usual routine of life; but a few days later is stricken down by an acute attack of poliomyelitis. Wickman expresses the suspicion that these cases may be relapses, brought on by exertion, and may illustrate the therapeutic value of *rest*, after even a very mild attack of this disease.

Numerous cases are reported in which no constitutional disturbance was noted prior to paralysis. As such cases have most commonly occurred in children, it is probable that in many instances a mild febrile stage has been overlooked. It nevertheless appears to be certain that cases of poliomyelitis may develop with constitutional symptoms which are negligible.

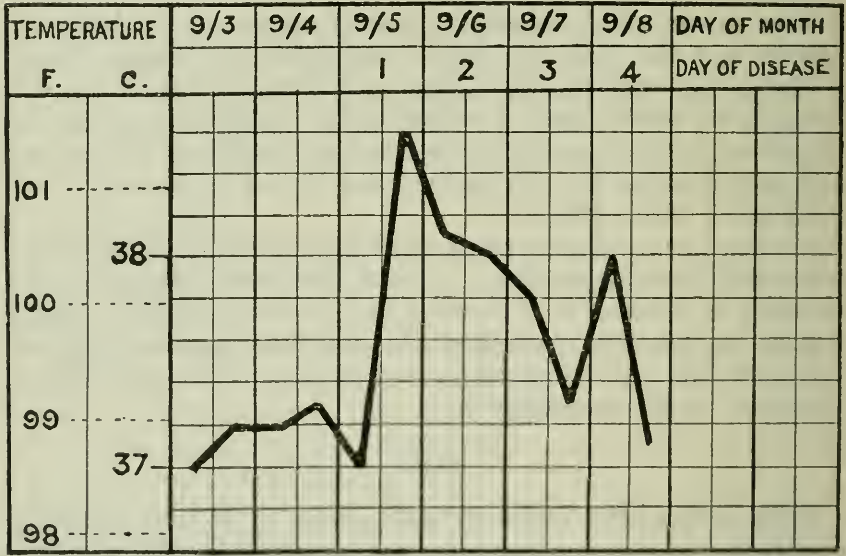
ONSET.

Acute poliomyelitis is usually quite abrupt in its onset, suddenly prostrating persons in apparently good health. The first symptoms observed vary a good deal. A sudden, sharp rise of temperature is probably the most common feature; a definite chill is rare. In its onset acute poliomyelitis may present the clinical picture of mild meningitis, acute neuritis, gastroenteritis, or tonsillitis. In some epidemics gastroenteritis has been the most prominent symptom of onset; in others, meningitis, neuritis, or tonsillitis. In a certain proportion of cases the onset is gradual and insidious.

GENERAL SYMPTOMS.

Fever is perhaps the most constant single symptom, although it seems fairly well established that some cases run their course without fever. The rise of temperature is usually sudden and sharp, often reaching its maximum in the first day of illness.

The range of temperature is quite variable. Wickman states that it is usually from 38° to 39° C. (99° to 102.2° F.). The investigation of the New York epidemic of 1907 showed the most usual range of fever to be from 101° to 104° F. Higher temperatures (105°–106° F.) have occasionally been noted. The height of the temperature is, according to Wickman, no index to the severity of the infection. It has been noted, however, by Lovett and Lucas[1] that cases in which the onset is accompanied by severe symptoms are more apt to result in extensive paralysis than cases with mild symptoms. Abortive cases, which recover in a few days, may, however, run quite as high temperatures as cases resulting in extensive paralysis or death.



C. R. D. Boy, 4 months old. Taken sick in General Foundling Asylum, Stockholm, Sept. 5, 1899. Extensive paralysis. Died Sept. 9, 1899. (Wickman, 1907.)

Exact records of the course of the fever are scarce. The following charts, adopted from Wickman, illustrate the irregularities in the development and course of the fever.

The fever may be expected to continue from one to seven days, usually falling to normal about the time paralysis develops. Cases are cited, however, in which the fever has continued for several weeks.

Headache is complained of by a large proportion of those who are old enough to give a clear account of their sensations. According to Wickman's observations the headache is usually occipital, but the committee which investigated the New York epidemic found it more commonly general or frontal. The headache is usually of moderate severity, such as is to be expected in almost any acute general infection, but is occasionally intense, constituting the most prominent symptom.

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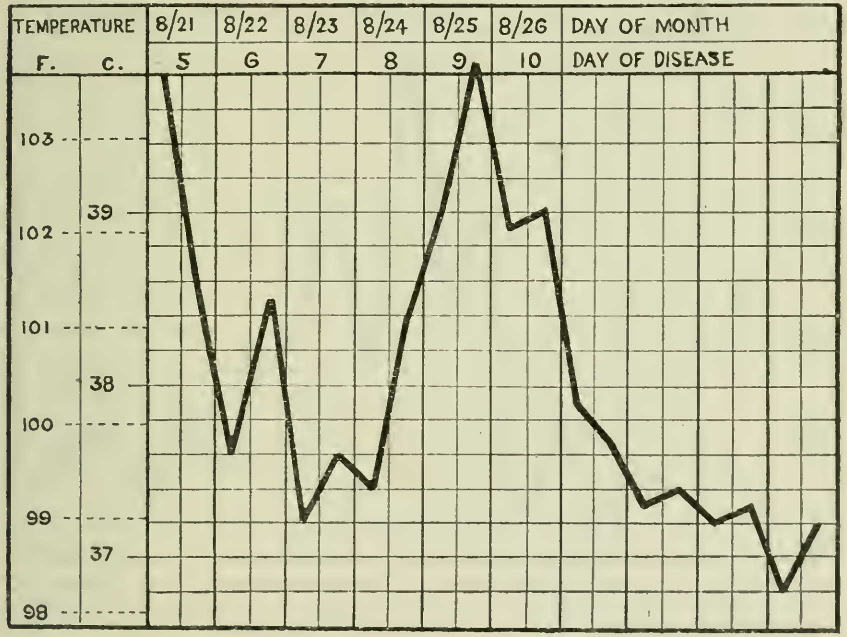
[1] Lovett, R. W., and Lucas, W. P., Jour. Am. Med. Assn., 1908, vol. 51, pp. 1677–1684.

Prostration.—When the onset is sudden and acute there is marked prostration from the first. Even in cases with mild constitutional symptoms the prostration is often much greater than would be expected. Extreme weariness and muscular weakness are characteristic features of many mild, abortive cases.

Digestive system.—Some disturbance of digestion is among the most common early symptoms. Constipation is perhaps the most usual derangement. Diarrhea has been very common in certain epidemics, notably one in Westphalia studied by Krause,[1] but in recent American epidemics has been found to be much less usual than constipation. More serious disturbances of the bowels, such as obstipation or incontinence are rather rare. Vomiting is very common; it usually occurs early in the illness and subsides in a few days. When constipation is marked there is apt to be abdominal distention.



J. P. Girl, 17 years old. Taken sick Aug. 17, 1905. Quite extensive paralysis of arms and legs. (Wickman, 1907.)

Respiratory system.—Catarrhal conditions of the respiratory system are rare, a point emphasized by Wickman as an aid in the early differentiation of acute poliomyelitis from influenza, which it often resembles in many respects. Sore throat is fairly common in some epidemics but is not in general a prominent symptom. More serious respiratory troubles, especially broncho-pneumonia, may develop later in the disease, due to paresis or paralysis of respiratory muscles.

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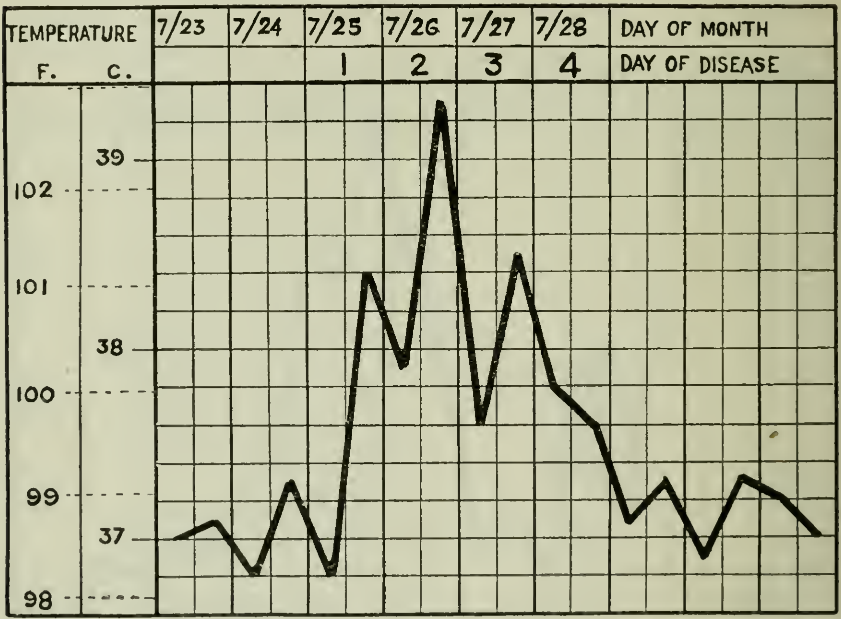
[1] Krause, P., Deutsch. med. Wochenschr., 1909, vol. 35, p. 1822.

Urinary system.—Although, post-mortem, the kidneys are sometimes found congested, with incipient parenchymatous degeneration, there is very seldom any clinical evidence of damage to the urinary organs. Albuminuria is rare. Retention of the urine occurs occasionally. Incontinence of urine is more rare.



K. J. Boy, 2½ years old. Convalescent from an exudative pleurisy at time of onset (of acute anterior poliomyelitis), July 25, 1899. Paralysis of the neck, July 26. (Wickman, 1907.)

Circulatory system.—The heart's action suffers the derangement common to acute infections. More serious disturbances—arrhythmia, tachycardia, bradycardia—may result from early involvement of the vagus center. Vaso-motor disturbances are sometimes observed, but are not characteristic.

The skin.—Excessive sweating has been noted by Müller[1] as a characteristic early symptom. While this has been noted occasionally in the epidemics studied elsewhere, it has not been found a constant distinctive feature. Skin eruptions were noted in less than 10 per cent of the cases investigated in the New York epidemic of 1907, and in 6 out of 150 cases studied in Massachusetts in 1909. The character of the skin lesions varied greatly. No skin eruption can be said to be at all characteristic of acute poliomyelitis. The rarity of herpes has been noted by Wickman.

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[1] Müller, Eduard, Münch. med. Wochenschr., 1909, vol. 56, pp. 2460–2462.

NERVOUS SYMPTOMS.

Restlessness or irritability is a very common and marked symptom. In children very often the first symptom to attract attention is their irritability. Older persons frequently show an early stage of excitement, characterized by extreme restlessness, vague anxiety, and mental perturbation out of proportion to the severity of their other symptoms.

An *apathetic, drowsy state* frequently follows, especially in children. A child may lie sometimes for a day or more, asleep or half asleep, unless aroused; but when aroused, the faculties are clear, or at most, somewhat confused. *Coma* is rare, it being a noteworthy feature of acute poliomyelitis that even in fatal cases the patient usually retains consciousness throughout the greater part of the illness. *Delirium* is not uncommon, but is usually of short duration, occurs early, and is often a confused state rather than a wild delirium such as characterizes meningitis. *Convulsions* sometimes occur in children.

Pain and tenderness.—Pain of some sort is a very constant early symptom, giving clinical confirmation to the anatomical studies which have shown the involvement of the meninges and spinal ganglia of the cord in the acute stage. The most characteristic pain is in the back of the neck and spine; the whole of the spinal column may be painful, especially on motion, and very tender. It is Wickman's opinion that the pain which young children evidently feel on being moved is due rather to the tenderness and consequent rigidity of the spine than to general cutaneous hyperesthesia. The pain in the neck and back is sometimes extremely severe. Pains are also very common in the arms and legs, sometimes in the face, and less commonly in the trunk. The pains in the limbs may resemble a myalgia, without cutaneous hyperesthesia or tenderness over the nerve trunks. In other cases, however, the clinical picture is that of neuritis, with marked hyperesthesia and tenderness over nerve trunks. The pains may be of short duration, subsiding with or before the onset of paralysis, but in some cases tenderness over the nerve trunks persists for weeks.

Sensory disturbances other than pain have been observed occasionally. *Paræsthesias* are not uncommon; numbness is noted in a fair proportion of cases in older children and adults. Wickman describes a case observed by him, with motor paralysis of both lower limbs, great *diminution of the sense of pain* from the hips down, and *diminution of temperature-sense* in the feet. He cites a similar case described by Wernicke, and also cites from reference other cases, in one of which there was complete *anesthesia*, and in several others *loss of electrocutaneous sensation.* Wickman thinks it probable from the pathology of the disease that closer observation of cases would show disturbances of temperature, pain, and electro-cutaneous sensation to be more common than heretofore reported.

Meningitic symptoms.—A train of symptoms indicative of meningeal irritation is frequently observed; these symptoms are—

Pain in the neck, which in varying degrees of intensity is quite common; *stiffness of the neck*, usually of moderate severity, rendering it painful or even impossible to bend the head forward; less frequently *retraction of the head*, due to actual contraction of the posterior neck muscles. While marked retraction of the head, such as is characteristic of cerebro-spinal meningitis is rare, a great many cases are found in which the head is held farther back than normal. *Stiffness of the spine* is usually due to the pain which motion of the spine causes, but in rare cases is due to actual *contracture of the spinal muscles.* A modified *Kernig's sign*—that is, inability to completely extend the leg when the thigh is flexed at a right angle, is sometimes present in cases showing other meningitic symptoms.

Some of the above symptoms are seen in the majority of cases with acute onset, as is to be expected from the fact that the pia mater is always found to be congested and infiltrated in the acute stage. Meningitic symptoms of moderate severity, when present, constitute the most characteristic symptom-complex of the early stage of acute poliomyelitis. When the meningitic symptoms are severe, the differentiation from cerebro-spinal meningitis may be impossible without examination of the cerebro-spinal fluid.

Motor symptoms.—Prior to the onset of paralysis, as well as in cases which do not result in paralysis, disturbance of the motor centers may be indicated by muscular twitching, jerking of the limbs, or tremor. The jerking of the limbs is usually slight and irregular. It may be most noticeable when the patient is asleep or may be brought on by the disturbance incident to making a physical examination. In one case which came under the writer's observation a slight disturbance of the patient set up clonic movements of one leg, continuing for several minutes. The other leg was flaccid, almost completely paralyzed.

Reflexes.—The patellar reflex is quite commonly exaggerated in the early stages, but is almost always diminished or abolished prior to the onset of paralysis; it may be abolished on one side and exaggerated on the other. In rare cases a persistently exaggerated patellar reflex may be associated with bulbar or cervical-segment paralysis (Wickman).

Reflexes other than the patellar have not been studied closely or extensively enough to warrant definite generalizations. Krause[1] found the skin, plantar, abdominal, and cremasteric reflexes normal in most cases. The New York investigating committee states that "A study of the reflexes established the general doctrine that in poliomyelitis the deep reflexes in the parts paralyzed are absent and that they are often absent in nonparalyzed parts."

Disturbances of the ocular reflexes are not characteristic, but need cause no surprise if noted in occasional cases.

Summarizing briefly the symptoms above enumerated, the characteristic features of acute anterior poliomyelitis in the early stage are sudden onset with fever, gastro-enteric disturbances (vomiting, diarrhea, constipation), occasionally sore throat, headache, restlessness followed often by apathy, pains in the neck, back, and limbs; muscular twitchings, exaggeration or abolition of tendon reflexes. Symptoms of a rather mild meningitis are present in a varying proportion of cases, and when present are rather characteristic.

The clinical picture prior to the onset of paralysis may be that of an indefinite general infection or toxemia, gastro-enteritis, tonsillitis, multiple neuritis, meningitis, or encephalitis.

TYPES OF ACUTE POLIOMYELITIS.

I. THE SPINAL POLIOMYELITIC TYPE.

The characteristic of this, the most typical and common form of poliomyelitis, is the development of a *flaccid motor* paralysis of parts supplied by nerves of *spinal* origin.

The paralysis develops, in the great majority of cases, within a week after the onset of acute symptoms, most commonly from the second to the fourth day. In exceptional instances it may develop more than a week after the onset.

In small children it is difficult to follow accurately the development of paralysis, which has given rise to the common statement that complete paralysis develops quite suddenly. Observations upon older persons have shown that the paralysis is often somewhat more gradual in its onset, beginning as a paresis, which may not be noted even by the patient until some effort is made which requires considerable strength. For instance, an adult, able to move his legs in bed, may not suspect a loss of power in them until he attempts to stand. Or the first indication of a beginning paralysis may be intention tremor and incoordination. In some cases the weakness never progresses to actual paralysis, receding sometimes to complete recovery in a few days. Cases of this kind are undoubtedly often overlooked in children. Usually, however, the paresis progresses rapidly to complete paralysis of the affected part, reaching its maximum, both in degree and extent, within one or two days. It is quite the general rule that the extent of the paralysis is greater at first than it is later. The paralysis is primarily due to edema and infiltration of the cord. As the acute inflammation in the cord subsides, improvement takes place in some of the affected limbs. This improvement may be quite rapid, so that a limb which was completely paralyzed may return to normal in a few weeks, or even in a few days. Where the acute process has resulted in the destruction of the ganglion cells there is, of course, no return of function in the corresponding muscle. The parts supplied by nerves from these centers are permanently paralyzed. Between edema and infiltration, with transitory disturbance of the function of the ganglion cells in an area, and complete destruction of the ganglion cells, there are many gradations. The cells may be damaged so severely as to return slowly to normal, or only a part of the cells in an area may be destroyed, leaving the rest capable of performing their function. The rate and degree of improvement is correspondingly variable, and there is no certain means of telling, when the paralysis is at its maximum, how extensive it will finally be.

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[1] Münch. med. Wochenschr., 1910, vol. 57, p. 47.

A sufficient number of statistics have been collected within the past few years to warrant some generalizations as to the parts most commonly paralyzed. The lower limbs are affected more than twice as frequently as the upper. Any combination may occur, as both legs, one leg and one arm of the same or opposite sides, both legs and one arm, both legs and both arms, both arms and one leg, both arms alone, etc. Combinations of parts supplied by the same spinal segment are more common than combinations of parts supplied by different segments—for example, it is more common to have paralysis of both legs than of one leg and one arm.

The resulting permanent paralysis, while it may involve one or more limbs in their entirety, is more usually limited to certain muscle-groups. In the lower limbs the groups most often affected are the peroneal and the quadriceps femoris. In the upper extremity the scapular muscles, deltoid, and upper-arm muscles are more frequently affected than the muscles of the forearm and hand.

Paralysis of the extremities is the most common and most serious feature of poliomyelitis; but the muscles of the trunk are affected more often than is generally supposed. In the acute stage the muscles of the back are very often paralyzed. As this usually occurs while the patient is confined to bed and in connection with paralysis of one or more extremities and is often of comparatively short duration, it may easily be overlooked. Paralysis of the neck muscles, rendering the patient unable to raise the head, is less common, occurs most frequently in combination with paralysis of the upper extremities, and can hardly be overlooked. Wickman lays emphasis upon the comparative frequency of paralysis of the abdominal muscles, usually associated with rather extensive paralysis of the extremities. When abdominal paralysis is bilateral, distention is apt to result; the abdomen is flaccid and can not be contracted in expiratory efforts; the patient is unable to raise his body from the recumbent posture without support. Unilateral or more localized abdominal paralysis may give rise to hernia-like protrusions and retraction of the navel toward the unaffected side.

Paralysis of the bladder and rectum is very rare as compared with paralysis of the lower limbs. In cases with extensive paralysis of the extremities, retention of urine may occur, indicating a paralysis of the bladder, but this condition is almost without exception of short duration. Paralysis of the sphincters, with incontinence of feces or urine, is also rare.

Paralysis of the muscles of respiration seldom occurs except in cases of extensive paralysis. It may occur, however, with less extensive paralysis of parts supplied by the cervical segment of the cord. If the intercostal muscles are paralyzed, the chest is immobile, and respiration is of the abdominal type. Paralysis of the diaphragm causes a reversal of the usual *abdominal* movements in respiration; the abdomen is retracted in inspiration and protruded in expiration. Diaphragmatic paralysis is more serious than intercostal paralysis. Paralysis of both diaphragm and intercostals causes death by respiratory failure. Respiratory paralysis is the gravest symptom of acute poliomyelitis. Occasionally, however, the disturbance of function of these muscles does not reach total paralysis, and in such cases may be quite transient. If the patient does not die of the respiratory paralysis or of pneumonia secondary thereto, these muscles are likely to return to their normal function.

The tendon reflexes in paralyzed limbs are totally abolished in the great majority of cases. Prior to the onset of paralysis, however, the reflexes, especially the patellar, are quite commonly exaggerated. The exaggeration of any reflex, however, need not cause astonishment. Even after the development of complete *flaccid* paralysis of a limb, exaggeration of the patellar reflex may persist. This, according to Wickman's view, may be accounted for by a lesion in the pyramidal tract of the cord, overcompensating the diminution of the reflex caused by the partial destruction of the ganglion cells of the anterior cornua.

The eye reflexes have been found disturbed in various ways. The pupils may react sluggishly or unevenly. Wickman has noted in rare cases signs of involvement of the cilio-spinal center in the cervical cord, viz, narrowing of the aperture between the lids of one side, with contraction of the pupil.

The subsidence of the symptoms which characterize the preparalytic stage is usually about coincident with the development of paralysis. The temperature may, however, in rather exceptional cases persist for a week or more after this time. The persistence of other constitutional symptoms is variable. While the acute pains in the limbs usually subside about this time or even before, there is often a persistent tenderness of the muscles and nerve trunks, and considerable pain in the joints on attempted passive motion.

Stage of regression.—As already stated, following the development of paralysis, there is a more or less indefinite stage of improvement. Up to a certain point this improvement is rapid, being noticeable from week to week, perhaps from day to day, until a part or in some cases all the paralyżed muscles are restored to their normal function. After the first few weeks improvement is much slower; the parts which remain paralyzed now show atrophy, and quite frequently a lowering of surface temperature. This indicates a severe degree of damage to the spinal motor centers, but not necessarily complete destruction. Even after several months, improvement may continue to take place in muscles that appeared completely paralyzed.

Contractures of the muscles and deformities of the limbs due to such contractures or to overaction of healthy muscles opposing paralyzed muscles are likely to occur in this stage unless care is exercised in their prevention.

The electrical reactions of the paralyzed limbs usually show alteration by the second week. The alteration may consist of a diminution of the normal electrical excitability of the muscles or more profound changes—the reaction of degeneration. The development of the reaction of degeneration, denoting destruction of the spinal center of a muscle, is given by Church and Petersen[1] as follows:

"First. The *muscle* responds weakly, sluggishly, and deliberately to faradism, and shows a tendency to maintain the contraction after the current is withdrawn. This is the *modal change*.

Second. The *nerve trunk* loses progressively and equally its responsiveness to both galvanism and faradism—a quantitative change.

Third. The *muscle* becomes much more excitable by galvanism and much less excitable by faradism, which latter reaction, with the nerve trunk responses, is completely lost after two or three weeks. This is the *qualitative change*.

Fourth. A *polar change* appears in the *muscle* about the second week, when directly stimulated by galvanism. The anodic closing contraction now equals or exceeds the cathodal closing contraction.

If there has been complete destruction of the nerve elements, with complete degeneration, *all electrical response* is gradually lost."

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[1] Church, H., and Petersen, F.: Nervous and Mental Diseases. Phila., 1907, W. B. Saunders Co., 5th ed., p. 46.

II. THE ASCENDING OR DESCENDING TYPE OF PARALYSIS.

In the more common spinal type of poliomyelitis the paralysis is pretty definitely limited, reaching its maximum in a few hours or a few days. In some cases, however, the paralysis progresses from the part first affected, either ascending or descending until nearly the whole of the body is paralyzed, or until death ensues from paralysis of the respiratory muscles. Usually the progress of the paralysis is *upward*, affecting in order the legs, abdomen, back, intercostals, arms, neck, and diaphragm. The progress may be very rapid; in one case which came under my observation, death ensued from respiratory paralysis 48 hours after the onset of the illness and less than 24 hours after paralysis was first noted. In some epidemics cases of this type have been observed more frequently in young adults and older children than in infants. The clinical course of a case of ascending or descending acute poliomyelitis is identical with that of a Landry's paralysis. Wickman has shown that a number of cases diagnosed as Landry's paralysis were in reality acute ascending poliomyelitis. He also doubts whether this type is more common in adults than in children, ascribing the general impression to that effect to the greater accuracy with which the course of the paralysis can be followed in an adult.

When the paralysis is of the descending type, appearing first in the upper extremities or in the muscles supplied by the cranial nerves, death from respiratory failure is likely to occur before the lower limbs are affected.

Respiratory failure may be due either to paralysis of the respiratory muscles (intercostals and diaphragm), as already described, or to a lesion affecting the respiratory center in the medulla. In the latter case the onset of dyspnœa is more sudden. Cheyne-Stokes respiration and acceleration of the heart's action may be noted in such cases, due to interference with the vagus center.

It is typical of such cases as the above that the patient retains consciousness to the end.

III. BULBAR (MEDULLARY) OR PONTINE TYPE.

This type embraces those cases in which there is paralysis of muscles supplied by *cranial* nerves whose nuclei are situated in the medulla oblongata or pons cerebri. It includes: (*a*) cases in which, in addition to the paralysis of the cranial nerves, there is paralysis of typical spinal type, and (*b*) cases in which the only paralysis is bulbar.

Wickman cites Medin (1890) as the first to call attention to the frequency of paralysis of cranial nerves in epidemic poliomyelitis. The unexpected frequency of this form of paralysis has been one of the striking facts brought out by the recent studies of Wickman, the New York Investigation Committee, the Massachusetts State Board of Health, and others. In the report of the New York committee paralysis of the cranial nerves was found as follows: Facial, 27; eye muscles, 26; eyelids, 18; speech, 28; out of a total of 625 to 700 cases. The report of the Massachusetts State Board of Health for 1909 records 34 cases of facial paralysis in a total of 628 cases of poliomyelitis (4.7 per cent). In 150 cases studied more carefully double vision was noted in four cases, difficulty of deglutition in two, difficulty of speech in two. Medin [1] noted involvement of some of the bulbar centers in 17 out of 65 cases (=26 per cent). It would appear from the wide variations between these statistics that there must be differences in epidemics in regard to the frequency of the occurrence of cranial-nerve paralysis.

The most common paralysis of this type is facial, which is much more often unilateral than bilateral. Ocular paralyses are next in frequency. The external rectus is most frequently affected, causing the eye to turn inward. Paralysis of the oculo-motor may cause divergent squint, with or without ptosis; or, more rarely, ptosis may be the only indication of ocular paralysis. In very rare cases there is paralysis of all the muscles of the eye. Transient motor disturbances of the eye, either nystagmus, diplopia, or fixedness of the eyes may occur. Wickman cites two cases in which the optic nerve was affected, with resulting atrophy and blindness of one eye.

Sudden deafness, usually of short duration, has been noted in the course of acute poliomyelitis, but it is a very rare symptom.

Disturbances of deglutition, when they occur, are usually associated with rather extensive paralysis, although there are exceptions to this. Disturbances of speech were noted in 28 cases (not noted in 615 cases) collected by the New York investigation committee.

Paralysis affecting the respiratory center may also be included as a "bulbar" symptom. In a case reported by the writer sudden death was due apparently to this cause. The patient, a previously healthy girl of 12, after a few days of slight illness, died very suddenly, with no paralysis. There having been no distinctive symptoms of poliomyelitis in this case, the diagnosis was made only by post-mortem histological examination.

Paralysis of bulbar origin is often temporary, as is to be expected from the fact, already cited, that the damage to the ganglion cells in the bulb is usually less severe than in the cord.

Lesions in the white matter which forms the conducting tracts from the cerebellum may perhaps give rise to the acute ataxia noted in some cases. Similar lesions in the pyramidal tracts of the medulla.

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[1] Cited by Wickman: Beiträge zur Kenntniss der Heine-Medin'schen Krankheit, p. 27.

interrupting the connection between the cerebral and spinal motor centers, may give rise to exaggeration of reflexes.

IV. CEREBRAL OR ENCEPHALITIC TYPE.

There has long been a discussion among clinicians as to the occurrence, in acute anterior poliomyelitis, of paralysis due to lesions in the motor area of the brain. Paralysis due to such a lesion would be monoplegic or hemiplegic, and spastic, resulting in contractions, but no atrophy. A similar paralysis might result from lesions in the conducting tracts of the upper motor segment.

Paralysis of this type is extremely rare in acute poliomyelitis. Wickman found no example of it among the 1.031 cases studied by him, and the collective investigation of the New York epidemic failed to reveal any case of this type. Wickman, however, considers the occurrence of the type established by the following evidence:

1. Lesions are commonly found in the cortex of the brain at autopsy, even when there has been no clinical evidence of the existence of such lesions.
2. A number of authors[1] have noted, in epidemics of acute poliomyelitis, the occurrence of cases presenting initial symptoms similar to acute poliomyelitis, but resulting in spastic hemiplegia. Pasteur, Buccelli, and Hoffman noted instances in which two or more children of a family were affected about the same time, with similar initial symptoms. One child developed spastic hemiplegia, and the others developed the typical spinal flaccid paralysis of acute poliomyelitis.
3. Others have reported the coexistence in the same patient of typical flaccid spinal poliomyelitic paralysis in one part of the body, and equally typical spastic cerebral paralysis in other parts. Pierre-Marie and Rossi[2] were able to demonstrate by autopsy on a case of this kind well-marked cortical and spinal lesions.

V. THE ATAXIC TYPE.

This type, like the preceding, was first differentiated by Medin, who noted, during the Stockholm epidemic, cases whose motor disturbance was an ataxia of cerebellar type, associated with exaggerated reflexes, not followed by atrophy, and terminating usually in recovery. According to the observations of Wickman and to more recent observations in the United States, cases in which a marked ataxia is the only motor disturbance are relatively rare. It is not rare, however, to find some degree of incoordination associated with paresis in the early stage of cases of acute poliomyelitis. Incoordination may be ascribed to several possible causes:

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[1] Moebius, Schmidt's Jahrb., 1884; Pasteur, W. Trans. Clin. Soc., 1897; Buccelli, Policlinico, 1897; Strümpell, Beitr. z. path. Anat. u. klin. Med., Leipzig, 1897; Medin, cited by Wickman, Beiträge zur Kenntniss der Heine-Medinschen Krankheit, p. 72; Hoffman, cited by Wickman, ibid.

[2] Cited by Wickman. Beiträge zur Kenntniss der Heine-Medischen Krankheit, pp. 74–75.

(1) Lesions of the cerebellum.

(2) Lesions in the conducting tracts leading from the cerebellum.

(3) Lesions in the posterior cornua of the cord, affecting muscle sense.

(4) Paresis of limbs, especially paresis of certain groups of muscles, disturbing the balance between these and their opposing (unaffected) muscles.

(5) Peripheral neuritis.

There is ground to believe that any of the above lesions may occur, in varying degrees, in cases of poliomyelitis, except, perhaps, peripheral neuritis, which is considered improbable.

VI. POLYNEURITIC TYPE.

Wickman describes three classes of cases *clinically* resembling multiple neuritis:

(1) Cases which in the stage of onset are characterized by marked pain and tenderness in the extremities, but which recover without paralysis or with only a transitory paresis; many of these cases could perhaps be better classed as abortive.

(2) Cases in which, after the subsidence of acute symptoms, there remains tenderness of the nerve trunks.

(3) Cases of acute ataxia associated with marked pain and tenderness; such cases may be considered as belonging to either the ataxic or the polyneuritic type, dependent upon the predominance of ataxia, or of pain and tenderness.

The frequent occurrence during epidemics of cases clinically resembling acute polyneuritis, and the occurrence of symptoms of neuritis in cases of undoubted poliomyelitis, are sufficient to establish the identity of causation between this type and the paralytic form of the disease. There has been some discussion as to whether the clinical picture in these cases is actually due to inflammation of the peripheral nerves or to lesions in the cord. Wickman concludes that the lesions are central, giving the following reasons:

(1) There is no loss of sensation in these cases, whereas in toxic, peripheral neuritis, loss of senation is usually more marked than loss of motion.

(2) Post-mortem examination has failed to reveal peripheral neuritis in cases of poliomyelitis, even where the involvement of the cord was very extensive.

(3) These symptoms may all be accounted for by lesions which are quite generally found in the spinal cord in cases of poliomyelitis.

viz, diffuse infiltration and edema of the whole cord, infiltration and edema of the pia mater.

Infiltration of the spinal ganglia has, however, been found at autopsy in cases of poliomyelitis, both human [1] and experimental.[2]

VII. THE MENINGITIC TYPE.

Symptoms indicative of a mild grade of meningitis have been noted (p. 28) as among the most characteristic manifestations of acute anterior poliomyelitis in the early stage. Such symptoms are not usually, however, predominant over the other symptoms. In some cases, the proportion of which seems to vary in different epidemics, the most striking symptom complex of the acute stage is as follows: Intense headache, ocular disturbances, pain in the neck and back, retraction of the head, contracture of the spinal muscles, spasticity of the limbs, Kernig's sign. No better idea can be given of this type than by citing a case of Wickman's:

Wickman's case No. 299.—Boy, 10 years old; taken sick August 18, 1905, after feeling badly for several days. Headache, fever, and vomiting; could be up and out of bed for the first few days, after which he was confined to bed; paresis noted later; stiffness of neck, pains in his whole spine; could not support himself upon his legs.

August 29: Lies with head retracted and stiff neck; cries when attempt is made to raise his head from pillow; can move head from side to side, but can not raise it; is tender all over spine and can hardly bear to be lifted up; the back is bowed (opisthonos) so that the patient can not lie flat upon the mattress; lying upon his back, he is supported upon his shoulders and hips, and a hand may be passed between his back and the bed; patient keeps his knees flexed—can extend them, but only with considerable pain; the feet hang limp and can neither be flexed nor extended; belly retracted and walls tense and tender; abdominal muscles paretic; patellar reflex abolished; cremaster and abdominal reflexes marked.

After about seven weeks in bed he was able to crawl upon the floor and eventually to walk.

October 22, 1905 (examination by Wickman): Gait "wabbly," paretic; patient drags the toes; is said to fall often; leg muscles atrophic and flaccid; thigh muscles feel flaccid, but not noticeably atrophied; diminished dorsal flexion of left foot; otherwise movements of legs all possible but weak; glutei of both sides weak, but can be contracted; has difficulty in raising himself after bending over, as to pick up something from the floor, helping himself up with his hands upon his legs like a person with progressive muscular atrophy. On raising the leg, extended on the thigh, patient feels pain at an angle of about 45°; no pain if knee is flexed; no contractions of muscles; patellar reflex on both sides exaggerated; no ankle clonus.

The diagnosis of poliomyelitis in this case is confirmed by the subsequent development of flaccid paralysis.

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[1] Strauss: Epidemic Poliomyelitis, Report of the Collective Investigation Committee on the New York Epidemic of 1907, p. 87.

[2] Flexner, Jour. A. M. A., 1910, vol. 55, pp. 1105–1113.

In other cases, however, there may be no paralysis, or what may be even more confusing, an ocular or facial paralysis. A fatal case of this kind, reported by Wickman, is abstracted for illustration:

H. K., female, age 27, married; taken sick suddenly August 19, 1905, with fever, headache, pains in back; next day vomiting so violently as to dislocate the jaw; tenderness and stiffness of neck, increasing until head was moderately retracted; violent tonic contraction of the shoulder muscles, throwing the arms up to the head; tonic contractions, flexing elbows, flexing fingers, and adducting thumb; cramp in muscles of the lower jaw, drawing it downward; no ocular paralysis; cramps so painful as to require chloroform; evening temperature 37° C. (99.6° F.). Patient fully conscious; during night cramps continued, and later affected muscles of back, causing opisthotonus.

August 21: Morning temperature 38.8° C. (101.8° F.); patient being six months pregnant, eclampsia was suspected, and forced delivery undertaken successfully; cramps continued, extending to legs; inability to swallow and difficulty of speech developed later in the same day; condition continued until death, at 6 a. m., August 22. Patient conscious throughout.

An autopsy was performed, revealing typical histologic lesions of acute poliomyelitis. The cerebrospinal fluid was found greatly increased in quantity and quite clear.

It will be noted that in neither of the above cases was there loss of consciousness. This can not, however, be taken as a constant point of differentiation between the meningitic form of acute poliomyelitis and cerebrospinal meningitis, for cases of poliomyelitis are cited, both by Wickman and by others, in which there was delirium followed by coma.

While there should be no great difficulty in distinguishing between an epidemic of poliomyelitis and an epidemic of cerebrospinal meningitis, there may be great difficulty in making the diagnosis in a particular case, especially if not closely associated with an epidemic of either disease. Lumbar puncture, with examination of the cerebrospinal fluid, is the only certain means of differentiation in such cases.

VIII. ABORTIVE FORMS.

Wickman[1] cites Breiglieb, Pasteur, and Leegard as having noted in intimate association with cases of undoubted poliomyelitis other cases of illness with strikingly similar initial symptoms, but terminating in rapid and complete recovery without paralysis. Caverly[2] also noted during an epidemic of poliomyelitis around Rutland, Vt., in 1894, that the prevalent diseases of children were accompanied by unusual nervous manifestations. It was Wickman, however, who first clearly pointed out the frequent association between cases of undoubted poliomyelitis and cases of a similar illness not followed by paralysis. It was he who recognized the latter as mild or abortive forms of acute anterior poliomyelitis, and called attention to the importance of including them in studies of the epidemiology.

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[1] Wickman: Beiträge zur Kenntniss der Heine-Medinischen Krankheit, p. 132.
[2] Caverly, S. C., Med. Record, 1894, vol. 46, p. 673.

In regard to the cases of illness without paralysis, considered by Wickman and others to be abortive forms of poliomyelitis, there are two chief points to be considered: first, whether such cases are due to the same infection as the paralytic forms of poliomyelitis, and second, whether they are clinically distinguishable from other infections.

(*a*) *Etiologic identity of abortive and paralytic forms.*—It has already been noted that the symptoms of acute poliomyelitis are due to *general infection*, *diffuse inflammation* of the central nervous system, and more severe *localized lesions* of the cord and brain. The localization of the nervous lesions gives to this disease its characteristic features and distinguishes the various types from one another. An abortive case of poliomyelitis may be considered as a case presenting only the symptoms of general infection and perhaps some diffuse inflammation of the cerebrospinal axis. The symptoms referable to these causes would be the same as the early symptoms in cases which later develop characteristic paralysis. There has been no pathologic evidence brought forward to prove the anatomic changes assumed as occurring in abortive cases, but the clinical evidence is very strong:

(1) Many observers in many parts of the world have noted during epidemics of poliomyelitis *cases presenting the same initial symptoms as paralytic cases*, but recovering in a short while without paralysis.

(2) Almost every closely studied epidemic shows a *gradation in severity of nervous symptoms*—extensive permanent paralysis; slight transient paralysis; partial paralysis (paresis); ataxia without paralysis; meningitic or neuritic symptoms without motor disturbances; general infection without distinctive nervous symptoms of any kind. A group of cases showing all these gradations, occurring in a circumscribed area within a short time, all presenting somewhat similar initial symptoms, differing to some extent from the symptoms of more usual infections, seldom fails to convince the observer of the existence of abortive cases of poliomyelitis.

(3) The occasional occurrence of such cases during an epidemic of poliomyelitis might be put down to merely coincident prevalence of two or more distinct infections; the *frequent*, *almost constant*, *occurrence* of such cases in intimate association with frank cases of poliomyelitis can not be ascribed to fortuitous coincidence.

(4) Experiments have demonstrated that monkeys inoculated with poliomyelitis occasionally develop an abortive form of the infection, characterized by rather mild and indefinite symptoms. Roemer and Joseph[1] have demonstrated in monkeys an immunity following such abortive attacks.

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[1] Roemer, P., and Joseph, K., Münch. med. Mochenschr., 1910, vol. 57, pp. 520–522.

(5) Netter and Levaditi[2] have shown that the serum of a child recently recovered from an abortive attack was capable of neutralizing the virus of poliomyelitis. This property had been previously demonstrated in the serum of persons and monkeys who had recovered from frank attacks of poliomyelitis and had been shown to be absent from the serum of normal persons and monkeys. It may be taken as convincing evidence of infection with the virus of poliomyelitis.

It is therefore well established by clinical and experimental evidence that the infection of acute anterior poliomyelitis may cause slight illness without definite motor disturbances.

(*b*) *The recognition of abortive cases.*—Granting the occurrence of abortive cases, their recognition remains a difficult problem. In the obsence of any specific diagnostic test it is necessary to recognize, by clinical observations alone, cases which do not present clear-cut clinical characteristics.

The symptoms vary greatly in kind and degree. There is usually some fever, often of very short duration, sometimes less than a day. Headache is one of the most constant features. Many cases exhibit an unusual degree of physical weakness and indisposition to exertion. Nausea and vomiting, associated with either diarrhea or constipation, are the most prominent symptoms in some cases. Restlessness and mental anxiety may be marked in older persons; irritability or drowsiness in children. Pain of some kind is a very common symptom. It may be a neuritic pain of the extremities, with hyperæsthesia, or it may be a myalgic pain of the neck and back. The most characteristic, though perhaps not the most common, pain is in the back of the neck, sometimes extending down the spine. Tenderness over the spine is, in some groups of cases, a common and characteristic symptom. Slight motor disturbances, such as slight paresis, ataxia, or diplopia, may be noted. If definite disturbance of motion can be made out, the case should be classed as frank rather than abortive poliomyelitis; but in children the only manifestation may be a rather indefinite clumsiness or indisposition to use the legs. Disturbance of the patellar reflex, either exaggeration, diminution, or abolition, is often noted. Convulsions or muscular twitchings may be observed in children.

Wickman distinguishes four clinical types of abortive cases:

(1) With symptoms of general infection.

(2) With gastroenteritis.

(3) With pain and hyperesthesia (like neuritic influenza).

(4) With meningitic symptoms (severe occipital headache, pain and tenderness in neck and back, and rigidity of neck).

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[2] Netter and Levaditi, Compt. Rend. Soc. Biol., 1910, Vol. LXVIII, No. 18, pp. 855-857.

Cases of the same type quite commonly occur in groups. In one epidemic most of the abortive cases may be of the gastroenteric type, in another of the meningitic type. The meningitic and neuritic types are apparently the more common forms. This may, however, be due to the fact that these forms are more *distinctive*, having less resemblance to the common epidemic diseases of summer, and are therefore more often recognized. There is, of course, no sharp line of differentiation between these several types of cases, which have been classified only according to the most prominent symptoms.

Frequency of abortive cases.—Wickman found among 1,025 cases of poliomyelitis studied in Sweden in 1905, 868 frank cases with paralysis, and 157 (= 15 per cent) abortive cases. He is of the opinion, however, that the proportion of abortive cases is greater than this. In Trästena, a small community where abortive as well as frank cases could be traced, he found 23 abortive cases (= 46 per cent) among a total of 49; in Atvidaberg, 11 abortive cases out of 31 (= 35 per cent), and in Smedjeback, 28 out of 50 (= 56 per cent).

Müller,[1] reporting an epidemic of 700 cases in the island of Nauru in January, 1910, states that many cases recovered without paralysis, and that many others had only slight paresis of two weeks or less duration. Only 50 cases had paralysis remaining after three months.

Anderson [2] observed in Polk County, Nebr., in the summer of 1909, 86 cases, of which 39 (= 44 per cent) had no definite paralysis.

The intensive study of 150 cases by the Massachusetts State Board of Health revealed 49 cases of illness, possibly abortive cases of poliomyelitis, occurring in the same houses with the 150 frank cases.

Mention has already been made of an epidemic which occurred in May, 1910, in a rural school district in Hancock County, Iowa, investigated later by the writer. Within a period of three weeks 30 cases of illness of the same general type occurred among 8 of the 12 families in attendance at this school. Five cases, resulting in typical, definite paralysis, were undoubtedly frank poliomyelitis. The remaining 25 may be considered in all probability abortive attacks of the same infection. The most common symptoms in this group were severe headache, pains in the limbs and back, stiffness of neck and spine, and gastrointestinal disturbances (nausea and constipation).

The proportion of abortive cases reported in various epidemics varies greatly, as is to be expected from the different circumstances under which the epidemics have been studied. In practically every epidemic studied in the light of Wickman's observations some abortive cases have been noted, and it may be stated pretty generally that the closer the observation the greater has been the proportion of abortive cases. From a review of the literature and from personal observations in several localities where poliomyelitis was epidemic I am of the opinion that abortive cases are probably as numerous, and very possibly more numerous, than frank cases.

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[1] Müller, A., Arch. f. Schiffs u. Tropen. Hyg., 1910, vol. 14, No. 17.

[2] Anderson, C. A., Pediatrics, 1910, vol. 22, pp. 543–558.

DIAGNOSIS.

Except in rare cases the diagnosis offers no difficulties after the onset of paralysis. The sudden onset of flaccid paralysis of one or more extremities, without loss of sensation, during or immediately following an acute febrile disturbance, is sufficiently characteristic. The rapid regression of paralysis of some of the parts, the reaction of degeneration, and atrophy of those muscles which remain paralyzed, complete the diagnosis. Even when the paralysis is transitory the diagnosis should offer no great difficulty if a satisfactory history can be obtained. Those cases in which cranial-nerve paralysis occurs without spinal paralysis have doubtless been frequently overlooked or wrongly diagnosed, and require more care in excluding local causes. The diagnosis in cases where the paralysis is of the cerebral, hemiplegic type will be very doubtful unless the early symptoms are quite typical and examinations of cerebro-spinal fluid and blood are made, or unless the association with undoubted cases of poliomyelitis has been striking. The combination of a flaccid paralysis with spastic, hemiplegic, paralysis would make the diagnosis of the cerebral type quite probable. While it is the general rule that the tendon reflexes are diminished or abolished in paralyzed extremities, the finding of persistent exaggerated reflexes does not exclude the diagnosis of poliomyelitis.

It is important to make the diagnosis, wherever possible, before the onset of paralysis, as well as in cases where no paralysis develops. This is obviously of great importance for the success of prophylactic measures. There is no evidence at present that failure to make an early correct diagnosis prejudices the patient's chance of recovery, but in the event that any effective specific treatment should be developed it will be necessary to employ it early. Before the use of a specific remedy it would be advisable to confirm the diagnosis by examinations of cerebrospinal fluid and blood, but the physician must at least suspect poliomyelitis from clinical evidence.

An acute febrile illness, with sudden onset, probably gastrointestinal disturbances, and symptoms of a mild meningitic inflammation, or other nervous symptoms, such as hyperesthesia, pains in the limbs, exaggerated or abolished tendon reflexes, ataxia, tremor, etc., warrants the suspicion of poliomyelitis. The diagnosis in such cases may be reasonably certain if the disease is known to be prevalent in the community. In the vicinity of Mason City, Iowa, the local physicians found it possible to make a fairly definite diagnosis prior to the development of paralysis in a considerable proportion of cases, probably 50 per cent. In other localities the proportion of cases showing distinctive initial symptoms may be smaller. There is always a certain proportion of cases in which the symptoms prior to paralysis are so slight or so indefinite as to arouse no suspicion of poliomyelitis, even in the presence of an epidemic.

The diseases with which poliomyelitis is most likely to be confounded are influenza, multiple neuritis, muscular rheumatism, acute articular rheumatism, gastroenteritis, and cerebrospinal meningitis. Certain forms of influenza may cause any or all of the symptoms seen in the early stage of poliomyelitis. Important considerations in the differential diagnosis are the frequency of catarrhal conditions of the respiratory tract in influenza and their rarity in poliomyelitis; the common occurrence of ear troubles in influenza: the greater prevalence of influenza in the winter months and of poliomyelitis in the summer months.

As already stated, the polyneuritic type of poliomyelitis gives at first a clinical picture identical with that of acute neuritis, from which it can be distinguished only by the subsequent developments. The swelling of the joints in acute articular rheumatism and the usual absence of severe constitutional symptoms in myalgia readily differentiate these diseases. Occasionally there is in acute anterior poliomyelitis tenderness and swelling of the joints, making the differentiation from acute articular rheumatism exceedingly difficult. Cerebrospinal meningitis can, in the great majority of cases, be excluded without lumbar puncture. Quantitative and differential leucocyte counts may be of aid, for in cerebrospinal meningitis the leucocyte count is high and the polymorphoneuclear leucocytes relatively increased, while in poliomyelitis there is more apt to be a leucopenia with relative increase in lymphocytes. In cases of the severe meningitic type, however, lumbar puncture is the only certain means of diagnosis.

TREATMENT.

No specific treatment has been developed.

The treatment in the acute stage must therefore be symptomatic, directed along the same general lines as in other acute infectious diseases.

Rest is important, and even in very mild cases should be enforced for a while after the subsidence of acute symptoms.

Moderate purgation is recommended, and, if necessary, enemata. Diuresis should be promoted by the free administration of water, or by saline enemata, in cases requiring them. Hot packs are useful to promote diaphoresis and to relieve the restlessness and the pains.

The diet during the acute stage should be liquid, easily digestible, and nutritious.

The administration of urotropin (hexamethylene-tetramine) is advised on the ground that formalin is excreted into the cerebrospinal fluid. While there is no proof as yet that this drug has any effect in modifying the course of the disease, its use is free from any valid objection and is quite generally recommended.

Except when absolutely necessary to allay severe pain, drugs which have for their purpose the relief of nervous symptoms should be avoided, especially the antipyretics and analgesics. Morphine or codeine may be given when necessary to allay pain.

When symptoms of pressure are present a lumbar puncture may be made, with the hope of relieving the condition. This should be done, however, with the strictest aseptic precautions, should not be undertaken by the inexperienced, and is not advised as an indiscriminate therapeutic measure.

The effect of any treatment in the acute stage is extremely difficult to ascertain. Quite independently of any treatment, cases which have severe early symptoms may recover in a few days with no paralysis at all, while other cases, with less severe initial symptoms, may result in extensive paralysis or death. The proportion of abortive and paralytic cases also varies greatly. In some epidemics half of the cases have been of the abortive type. It is therefore evident that even the complete recovery of a large proportion of apparently severe cases does not indicate that there was any specific virtue in the treatment which they received.

It is, however, reasonable to suppose that intelligent treatment along the lines indicated above will aid the patient in combating the infection, and will have some effect, however slight, in modifying the course of the disease.

The objects of treatment after the subsidence of the acute stage are to promote the comfort and general nutrition of the patient, prevent contractures and deformities of paralyzed parts, and to maintain the nutrition of paralyzed muscles. The general health of the patient is usually good, and intelligent supervision of diet, ventilation, etc., is all that is necessary to maintain it. Tonics may be given, but the administration of strychnine in doses larger than are usually given in tonics, with the idea of its exerting a specific restorative action upon the spinal motor centers is to be avoided.

For a considerable time after the onset of paralysis there is often pain in the paralyzed parts, due to sensitiveness of the nerve trunks. Motion may be very painful, and the limbs often become quite rigidly flexed. Hot baths, with gentle exercise, will do much toward relieving this pain and preventing or lessening contractures. Massage and electricity are contraindicated while pain and tenderness persist. Deformities must be prevented by suitable mechanical appliances, designed to keep the limbs in proper anatomic position.

For the treatment of the residual paralysis, after the subsidence of all acute symptoms, the reader is referred to articles cited in the appended bibliography and to the standard textbooks on orthopedic surgery.

PROPHYLAXIS.

While there are differences of opinion as to the contagiousness of epidemic poliomyelitis, its probability has been sufficiently demonstrated to render preventive measures imperative.

The patient should be isolated as completely as possible in a clean, bare room, well screened to keep out insects. The members of the family, other than the necessary attendant, should not be allowed to come into contact with the patient. All discharges, including sputum, nasal secretions, urine, and feces, as well as all articles (linen, eating and drinking utensils, etc.) which may be soiled by such discharges, should be thoroughly disinfected before they leave the sick room. The nurse and physician should observe the same precautions regarding their hands and clothing as in attending a case of scarlet fever.

The rest of the family should, so far as possible, be kept out of contact with the neighbors, at least to the extent of excluding the rest of the family from school and prohibiting all unnecessary visiting. The period during which isolation should be maintained is as yet indeterminate. Three weeks would seem to be a reasonable minimum for exclusion from school: but in some cases it may prove more practicable to fumigate the premises earlier than this.

Since the virus can be killed experimentally by a 1 per cent solution of peroxide of hydrogen, an antiseptic gargle of this solution is recommended to be used by the patient and other members of the family. The mentholated powder above mentioned (page 12) might perhaps be substituted for or used in conjunction with this solution.

As soon as practicable after the recovery of the patient the house should be fumigated with formaldehyd. If vermin are present, it would be advisable to use sulphur instead of formaldehyd.

In the presence of an epidemic it would be advisable to keep down the dust by sprinkling streets and yards. This is recommended because dry-weather conditions have seemed generally more favorable to the spread of epidemic poliomyelitis and because in several instances the abatement of dust has been followed by the cessation of an epidemic. It would also be advisable during an epidemic to keep children off the streets and away from public gatherings, to prohibit their using public drinking cups, to pay careful attention to their diet, to prevent gastrointestinal disorders, and to protect them from overheating and overexertion, which might lower vital resistance.

It is beyond the scope of this paper to enter into a discussion of State and municipal preventive measures. There is, however, practically unanimous agreement on the following points:

(1) That the disease should be required to be reported to the health authorities.

(2) That patients should be isolated.

(3) That members of their family should be excluded from schools for at least three weeks.

The degree of effectiveness of prophylactic measures is very problematic. A very apparent obstacle is the difficulty of recognizing cases early before the onset of paralysis and the difficulty, perhaps impossibility, of recognizing abortive forms.

PROGNOSIS.

The mortality from epidemic poliomyelitis varies greatly in different epidemics, as shown by the following figures, collected from several sources. Only cases showing *paralysis* are included in these figures.

Reported by—	Place.	Year.	Total cases.	Deaths.	Percentage mortality.
Caverly	Connecticut	1894	126	18	14
Wickman	Sweden (general)	1905	868	145	16.7
Do	Trastena, Sweden	1905	26	11	42.3
Do	Atudaberg, Sweden	1905	41	4	10
Do	Smedjeback, Sweden	1906	22	5	22.7
Committee of Investigation	New York	1907	[1] 2,000	[1] 100	[1] 5
Hill	Minnesota	1909	283	68	24
Lovett	Massachusetts	1909	628	51	8

[1] Estimated.

The mortality also shows variations according to the age of the persons affected; Wickman gives the mortality at different ages in 842 cases as follows: 0–11 years, 592 cases, 71 deaths, =12.2 per cent; 12–32 years, 250 cases, 69 deaths, =27.9 per cent.

The Massachusetts State Board of Health found the mortality in 628 cases, in 1909, to be as follows: Less than 1 year, 16 per cent; 1–10 years, 4 per cent; over 10 years, 20 per cent.

These figures agree in showing that the disease is relatively more fatal in older persons than in young children.

According to Wickman's statistics, death occurs most frequently within the first week of illness. Paralysis of respiration is the most frequent cause of death. Broncho-pneumonia, secondary to partial respiratory paralysis, may result fatally. The severity of the early symptoms bears no constant relation to the extent of supervening paralysis. Extensive paralysis, progressing after the first 24 hours, is usually a serious prognostic sign.

The chance of complete recovery—restoration of paralyzed parts to their normal function—is greater than has been commonly supposed. In Massachusetts in 1909, 62 of the 628 paralyzed cases (=10 per cent) were reported as recovered within a year. Out of 150 cases closely studied, 25 (=16.7 per cent) were found completely recovered after 3 days to 12 weeks. The extent of paralysis in these cases is given as follows: One thigh and leg, 4; both thighs and legs, 8; both thighs, 1; one leg, 2; one arm, 1; one leg, arm, and back, 1; one leg and back, 1; one thigh, leg, arm, and forearm, 1; one arm, forearm, and cervical region, 1; cervical region, 4; indefinite staggering gait, 1. It is shown by the above that some of these cases had been quite extensively paralyzed.

Complete recovery was recorded in 40 out of 754 cases (=5.3 per cent) investigated in the New York epidemic of 1907; and "almost complete disappearance of paralysis" in 13 (=1.8 per cent), giving a total of 53 cases (=7.1 per cent) making a practically complete recovery.

Hill[1] states that 15 per cent of 283 cases occurring in Minnesota during 1909 completely recovered within a year. Since 24 per cent of these 283 cases died, the 15 per cent of recoveries is equivalent to 19.2 per cent of recoveries among those who survived.

NOTE.—Since this paper went to press, Osgood and Lucas (Journ. Am. Med. Assn., Feb. 18, 1911, vol. 56, p. 495) have reported experiments demonstrating that the nasal mucous membrane of two monkeys, experimentally inoculated with poliomyelitis, remained infectious for six weeks and five and one-half months, respectively. This very important observation strengthens the suspicion of the existence of human "carriers," who may play an important part in the epidemiology of poliomyelitis. It raises still further doubts as to the efficiency of prophylactic measures directed only to persons in the acute stage.

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[1] Hill, H. W.: Epidemiological Study of Anterior Poliomyelitis in Minnesota. Trans. Section on Preventive Medicine, Amer. Med. Assn., 1910.

REFERENCES.

The references here cited do not constitute a complete bibliography of the subject. Only such articles are cited as are considered most useful in presenting a comprehensive view of the subject and most likely to be generally available. Articles marked (*) are of special value and articles marked (†) have extensive bibliographies appended. Many articles highly important from a historical point of view have been purposely omitted.

GENERAL.

* Epidemic poliomyelitis. Report of the Collective Investigation Committee on the New York Epidemic of 1907. Nervous and mental disease monograph series. No. 6. New York, 1910.

I. Epidemiology. Bolduan, Ager, Terriberry.

II. Conditions preceding onset and the early symptoms of the disease. LaFetra and Schwartz.

III. Symptomatology. Clark, Hunt, Jelliffe, Sachs, Zabriskie.

IV. Pathology and pathological anatomy. Flexner, Lewis, and Strauss.

V. Treatment. LaFetra, Jelliffe, Ager, Taylor, and Sachs.

Illinois State Board of Health Bulletin, Sept., 1910, vol. 6, no. 9. Reprint of a number of articles from Pediatrics of August, 1910.

Müller, Eduard. Die spinale Kinderlähmung. Berlin, 1910.

* Pediatrics. August, 1910, vol. 22, No. 8. Special poliomyelitis number. Etiology, epidemiology, pathology, symptomatology, treatment. Articles by C. A. Anderson, J. M. Armstrong, F. E. Coulter, Simon Flexner, J. S. Fowler, Maximilian Herzog, Colin K. Russell, George P. Shidler, I. Strauss, editorial and reviews.

* Wickman, Ivar. Beiträge zur Kenntniss der Heine-Medinschen Krankheit. Berlin, 1907, S. Karger. 8°. 300 p. 7 charts. Symptomatology and epidemiology.

——— Ueber die akute Poliomyelitis und verwandte Erkrankungen (Heine-Medinsche Krankheit). Jahrb. f. Kinderh., Berlin, 1909, vol. 67, p. 182–196. Epidemiology, symptoms.

EXPERIMENTAL POLIOMYELITIS.

* Flexner, Simon. The contribution of experimental to human poliomyelitis. Jour. Am. Med. Assn., vol. 55, Sept. 24, 1910, p. 1105–1113.

Krause P., and Meinicke, E. Zur Aetiologie der akuten epidemischen Kinderlähmung. Deut. med. Woch., vol. 35, Oct. 21, 1910, no. 42, p. 1825–1827.

Levaditi, C. L'étude expérimentale de la poliomyélite aiguë. Presse méd., vol. 18, 1910, p. 297–299.

Levaditi, C. Le virus de la poliomyélite aiguë. Presse méd., vol. 18, 1910, p. 378–380.

* Landsteiner, K., and Levaditi, C. Étude expérimentale de la poliomyélite aiguë. Ann. de l'Inst. Pasteur, vol. 24, no. 11, Nov. 25, 1910, p. 833-876.

EPIDEMIOLOGY.

* Caverly, C. S. Notes of an epidemic of acute anterior poliomyelitis. Journ. Am. Med. Assn., vol. 26, 1896, p. 1-5. Med. Record, vol. 46, 1894, p. 673.

Emerson, Herbert C. An epidemic of infantile paralysis in Western Massachusetts in 1908. Rep. Mass. State Board of Health, 1908, p. 764. Abst. in Boston Med. & Surg. Journ., July 22, 1909.

Frost, W. H. The field investigation of epidemic poliomyelitis. Pub. Health Reports, vol. 25, no. 46, Nov. 18, 1910.

Harbitz, F., and Scheel, O. Epidemic acute poliomyelitis in Norway and Sweden in the years 1903 to 1906. Journ. Am. Med. Assn., vol. 49, 1907, p. 1420-1425.

Hill, H. W. The contagiousness of poliomyelitis. Journ. Minn. Med. Assn., March 15, 1910.

* ———. Epidemiologic study of anterior poliomyelitis in Minnesota. Trans. Sect. Prev. Med. of Am. Med. Assn., 1910.

* † Holt, L. E., and Bartlett, F. H. The epidemiology of acute poliomyelitis. Am. Jour. Med. Sci., Phila., vol. 135, 1908, p. 647-662.

Job and Froment. Le poliomyélite aigue. Étude epidemiologique. Rev. de méd., vol. 30, 1910, p. 162, 378, 481, 651.

Krause, P. [Ueber die westfälische Epidemie von Kinderlähmung]. Deutsch. med. Woch., vol. 35, 1909, pp. 1822-1825.

Lovett, R. W. The occurrence of infantile paralysis in Massachusetts in 1907 [with special reference to etiology]. Boston Med. & Surg. Journ., vol. 159, 1908, p. 131-139.

———. A study of poliomyelitis in Massachusetts in 1907 and 1908. Journ. Nerv. & Ment. Dis., vol. 36, 1909, p. 681-684.

———. The occurrence of infantile paralysis in Massachusetts in 1908. Boston Med. & Surg. Journ., July 22, 1909. Rep. Mass. State Board of Health, 1908, p. 756.

* † ———. The occurrence of infantile paralysis in Massachusetts in 1909. Boston Med. & Surg. Journ., vol. 163, 1910, p. 37-55.

———. Infantile Paralysis. Am. Journ. Pub. Hygiene, vol. 20, Nov., 1910, p. 875-887.

* Müller, A. Eine epidemisch auftretende Erkrankung des Nervensystems auf Nauru. Arch. f. Schiffs.-u. Tropen-Hyg., vol. 14, Sept. 1, 1910.

Netter, A. Fréquence insolite des poliomyélites en France pendant l'été dernier: leur identité avec les cas observés à l'étranger sous forme épidémique; relations entre la poliomyélite et la méningite cérébro-spinale épidémique. Bull. et mém. soc. méd. de hôp. de Par., 1909, 3 s., vol. 28, p. 515-528. Ibid., p. 553. [A new case], Ibid., p. 629. Ibid., p. 746-761.

———. Apparition sous forme épidémique de la paralysis infantile à Paris et sa banlieue en 1909; Notions fournies par l'étude des épidémies des autres pays et par la pathologie expérimentale. Bull. Acad. de Med., vol. 63, 3 ser., 1910, p. 458-481.

Shidler, George P. The epidemic of spinal disease in Nebraska. Journ. Am. Med. Assn., vol. 54, 1910, p. 277-281.

* † Starr, M. Allen. Epidemic infantile paralysis. Journ. Am. Med. Assn., vol. 51, 1908, p. 112-120.

PATHOLOGY.

* **Harbitz, F.**, and **Scheel, O.** Pathologische-anatomische Untersuchungen über akute Poliomyelitis und verwandte Erkrankungen. Christiania, A. W. Broggers, 1907.

Hough, William H., and **Lafora, G.** The cerebrospinal fluid in acute anterior poliomyelitis. N. Y. Med. Journ., vol. 92, no. 19, Nov. 5, 1910, p. 924.

Lewis, Paul A. The pathology of experimental anterior poliomyelitis in the monkey. Proc. N. Y. Path. Soc., vol. 10, n. s., 1910, p. 47.

Robertson, H. E., and **Chesley, A. J.** Pathology and bacteriology of acute anterior poliomyelitis. Journ. Am. Med. Assn., vol. 55, Sept. 17, 1910, p. 1013.

Strauss, I. Studies on the pathology of poliomyelitis anterior acute based on the autopsy findings in five cases. Journ. Nerv. & Ment. Dis., vol. 36, 1909, p. 288.

*† **Wickman, Ivar.** Studien über poliomyelitis acuta. Arb. a. d. pathologisch. Inst. der Univ. Helsingfors, 1905–07. Berlin, 1907, S. Karger, p. 109–292.

——— Weitere Studien über Poliomyelitis acuta; ein Beitrag zur Kenntniss der Neuronphagen und Körnchenzellen. Deut. Zeitschr. f. Nervenh., Leipz., vol. 38, 1910, p. 396–436. 6 pl.

SYMPTOMS.

Buzzard, E. F. Acute poliomyelitis. Mod. Med. (Osler), vol. 7, 1910, p. 258–268.

Dakin, C. E. Acute epidemic poliomyelitis; symptomatology, diagnosis, treatment. Iowa Med. Journ., vol. 17, no. 5, Nov., 1910, p. 229–236.

Foerster, O. Zur Symptomatologie der Poliomyelitis anterior acuta. Berl. klin. Woch., vol. 46, 1909, p. 2180–2184.

Hamilton, A. S. Epidemic anterior poliomyelitis. Journ. Minn. Med. Assn., vol. 29, 1909, p. 423–428.

Krause, P. Zur Kenntniss der westfälischen Epidemie von akuter Kinderlähmung. Deut. med. Woch., vol. 35, 1909, p. 1822–1825.

LaFetra, L. E. Early symptoms in 63 cases of the recent epidemic of anterior poliomyelitis. Arch. Pediat., N. Y., vol. 26, 1909, p. 328–340.

Lucas, W. P. The diagnosis of infantile paralysis in the prodromal and early acute stage, as found in the experimental study of acute poliomyelitis in monkeys. Boston Med. & Surg. Journ., 1910, vol. 163, pp. 245–249.

Medin, O. Arch. des Medicin d'Infants, vol. 1, p. 259, 321.

——— Verhandl. d. X internat. Kong. Berlin, II Abt. VI, 1891.

Müller, E. Ueber die Frühstadien der spinalen Kinderlähmung. Münch. med Woch., vol. 56, p. 2460–2462.

Vogt, H. Poliomyelitis und Encephalitis; die Encephalitis der Kinder. Jaresb. f. ärztl. Fortbild., Münch., 1910, no. 5, p. 19–39.

TREATMENT.

***Bradford, E. H.**, et al. Methods of treatment in infantile paralysis; summarized by the department of orthopedic surgery of the Harvard Medical School. Boston Med. & Surg. Journal, vol. 162, 1910, p. 881–893.

Lovett, R. W., and Lucas, W. P. Infantile paralysis; a study of 635 cases from the Children's Hospital, Boston, with especial reference to treatment. [Abst.] Journ. Am. Med. Assn., vol. 51, 1908, p. 1677–1684.

McClanahan, H. M., Sachs, B., and Ridlon, John. Symposium on the treatment of acute anterior poliomyelitis. Journ. Am. Med. Assn., vol. 55, Oct. 22, 1910, p. 1464–1468.

Silver, David. The surgical treatment of infantile spinal paralysis. Journ. Am. Med. Assn., vol 55, Sept. 17, 1910, p. 1014–1021.

Skoog, Andrew L. Treatment of acute anterior poliomyelitis. Journ. Am. Med. Assn., vol. 55, Nov. 19, 1910, p. 1804.

LIST OF PUBLIC HEALTH BULLETINS.

[Those marked (*) are out of print. Those marked (†) can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the cost marked after each. Copies of those still available for distribution may be had by request from the Surgeon General, Public Health and Marine-Hospital Service, Washington, D. C.]

*1. Report on Trichinæ and Trichinosis. By W. C. W. Glazier. 1881. 212 pages. 87 il. 1 map. Paper. Senate Executive Document No. 9. Forty-sixth Congress, third session. Out of print.

*2. Report of the Etiology and Prevention of Yellow Fever. By George M. Sternberg. 1890. 271 pages. 21 pl. 20 il. Cloth. Out of print.

*3. Mortality Statistics in the United States for the year ending December 31, 1897. From Annual Report Marine-Hospital Service, 1898. 24 pages. Paper. Out of print.

4. Yellow Fever: Its Nature, Diagnosis, Treatment, and Prophylaxis and Quarantine Regulations Relating Thereto. By officers of the Marine-Hospital Service. Reprint from Annual Report Marine-Hospital Service, 1898. 176 pages. 1 il. Paper.

*5. Shipment of Merchandise from a Town Infected with Yellow Fever. By H. R. Carter. 1899. 15 pages. Paper. Out of print.

†6. Report of Commission of Medical Officers Detailed by Authority of the President to Investigate the Cause of Yellow Fever. By Eugene Wasdin and H. D. Geddings. July, 1899. 98 pages. 26 charts. 2 il. Paper. 5 cents.

*7. The Bubonic Plague. By Walter Wyman. January, 1900. 50 pages. Paper. Superintendent of Documents. 5 cents.

†8. Report of Commission Appointed by the Secretary of the Treasury for the Investigation of Plague in San Francisco. By Prof. Simon Flexner, Prof. F. G. Novy, and Prof. L. F. Barker. January 23, 1901. 23 pages. 1 map. Paper. 5 cents.

*9. Report Relating to the Origin and Prevalence of Leprosy in the United States. By a Commission of Medical Officers of the United States Marine-Hospital Service. 1902. 119 pages. 25 il. Paper. Senate Document No. 269, Fifty-seventh Congress, first session. Superintendent of Documents. Cloth. $1.00.

*10. Plague Conference. Containing a copy of the address of the chairman, and resolutions passed by a conference called in accordance with requests from a number of State Boards of Health, and under authority of section 7, act of Congress approved July 1, 1902, to consider the plague situation. Reprint from P. H. R. No. 4, Vol. XVIII, January 23, 1903. 9 pages. And February 6, 1903. 41 pages. Paper. Out of print.

†11. Transactions of the First Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1903. 120 pages. Cloth. 20 cents.

†12. Transactions of the Second Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1904. 95 pages. Cloth. 20 cents.

†13. The Public Health and Marine-Hospital Service of the United States. A Brief History. Prepared for the Louisiana Purchase Exposition. December, 1904. 16 pages. Paper. 5 cents.

†14. Sanatorium for Consumptives, Fort Stanton, N. Mex. By P. M. Carrington. Reprint from Annual Report Public Health and Marine-Hospital Service, 1904. 19 pages. Paper. 5 cents.

†15. Transactions of the Third Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1905. 52 pages. Cloth. 30 cents.

16. How to Prevent Yellow Fever—No Mosquitoes, No Yellow Fever. By Walter Wyman. July 31, 1905. 3 pages. Circular.

†17. Transactions of the Fourth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1906. 75 pages. Cloth. 35 cents.

†18. Transactions of the Fifth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1907. 47 pages. Cloth. 25 cents.

19. Trachoma, Its Character and Effects. By Taliaferro Clark and J. W. Schereschewsky. 1907. 34 pages. 6 il. Paper. (Second edition.)

*20. The Public Health and Marine-Hospital Service of the United States. A Brief History. Prepared for the Jamestown Ter-Centennial Exposition. 1907. 12 pages. Paper. Out of print.

†21. Transactions of the Sixth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. April, 1908. 79 pages. Cloth. 50 cents.

†22. The Present Pandemic of Plague. By J. M. Eager. 1908. 30 pages. Paper. 5 cents.

*23. Pellagra—A Précis. By C. H. Lavinder. July 24, 1908. 22 pages. 1 il. Paper. Revised. See Public Health Bulletin no. 48.

24. The Marine-Hospital Sanatorium, Fort Stanton, N. Mex. Prepared for the International Congress on Tuberculosis, held in Washington, September, 1908. 32 il. 56 pages. Paper.

*25. Hookworm Disease. Reprint from Annual Report P. H. and M. H. S., 1908. 5 pages. Paper. Out of print.

†26. Studies upon Leprosy.

I. The Present Status of the Leprosy Problem in Hawaii.

II. The Reaction of Lepers to Moro's "Percutaneous" Test.

III. A Note upon the Possibility of the Mosquito Acting in the Transmission of Leprosy. By W. R. Brinckerhoff. 1908. Investigations made in accordance with the act of Congress approved March 3, 1905. 25 pages. Paper. 10 cents.

27. Studies upon Leprosy.

IV. Upon the Utility of the Examination of the Nose and the Nasal Secretions for the Detection of Incipient Cases of Leprosy. By W. R. Brinckerhoff and W. L. Moore. 1909. Investigations made in accordance with the act of Congress approved March 3, 1905. 29 pages. Paper.

28. Studies upon Leprosy.

V. A Report upon the Treatment of Six Cases of Leprosy with Nastine (Deycke). By W. R. Brinckerhoff and J. T. Wayson, Honolulu, T. H.

VI. Leprosy in the United States of America in 1909. By W. R. Brinckerhoff. 1909. Investigations made in accordance with the act of Congress approved March 3, 1905. 25 pages. Paper.

†29. The Prevalence of Rabies in the United States. By J. W. Kerr and A. M. Stimson. 1909. 16 pages. Paper. 5 cents.

†30. The Rat and Its Relation to the Public Health. By various authors. 1910. 254. pages. 60 figs. 6 pl. Paper. 50 cents.

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2. Natural History of the Rat. By D. E. Lantz.
3. Plague Infection in Rats. By G. W. McCoy.
4. Rat Leprosy. By W. R. Brinckerhoff.
5. Bacterial Diseases of the Rat other than Plague. By D. H. Currie.
6. Organic Diseases of the Rat. By G. W. McCoy.
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†31. Transactions of the Seventh Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1909. 86 pages. Cloth. 35 cents.

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X. Flies in Relation to the Transmission of Leprosy. By D. H. Currie.
XI. Heredity Versus Environment in Leprosy. By H. T. Hollmann.

†40. Transactions of the Eighth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. November, 1910. 101 pages. Paper. 10 cents.

41. Studies upon Leprosy. November, 1910. 36 pages. Paper.
    XII. Notes on the Study of Histories of Lepers from the Standpoint of Transmission. By D. H. Curie.
    XIII. A Contribution to the Study of Rat Leprosy. By D. H. Currie and H. T. Hollmann.
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46. Transactions of the Ninth Annual Conference of State and Territorial Health Officers with the Public Health and Marine-Hospital Service. September, 1911.
†47. Studies upon Leprosy. By D. H. Currie, M. T. Clegg, and H. T. Hollmann. September, 1911. 10 cents.
    XIV. The Artificial Cultivation of the Bacillus of Leprosy.
    XV. Attempts at Specific Therapy in Leprosy.
48. Pellagra. A Précis. (Revised edition.) By C. H. Lavinder. September, 1911. (Second edition.)

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TREASURY DEPARTMENT
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PUBLIC HEALTH BULLETIN No. 45 -A.

July, 1911

A DIGEST OF THE LAWS AND REGULATIONS OF THE VARIOUS STATES RELATING TO THE REPORTING OF CASES OF SICKNESS

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BY

JOHN W. TRASK
Assistant Surgeon General

PREPARED BY DIRECTION OF THE SURGEON GENERAL

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A DIGEST OF THE LAWS AND REGULATIONS OF THE VARIOUS STATES RELATING TO THE REPORTING OF CASES OF SICKNESS.

By John W. Trask,

Assistant Surgeon General.

Reports of sickness are a necessity in public health work. Even a casual consideration of the subject will show that they are the foundation upon which public health work depends for its success. Accepting the function of the health officer as being the prevention of disease, a knowledge of the prevalence and geographic distribution of the preventable diseases within his jurisdiction is essential to his work. This knowledge is possible only in so far as cases of sickness are reported.

As our knowledge of pathology and epidemiology increases, additions are being constantly made to the diseases classed as preventable. It has long been recognized that certain of the more common contagious diseases, such as smallpox, scarlet fever, diphtheria, and measles should be reported, that proper restraint, isolation, or other indicated measures may be enforced for the protection of the community, or the public warned of possible danger. A community which has no means of knowing with what contagious diseases it is afflicted nor how many cases there are, nor where they are, is helpless to protect itself, and unnecessary sickness and deaths will result. Generally speaking, every case of an infectious disease is a focus from which other cases may directly or indirectly arise unless measures are taken to prevent them. Every typhoid-fever patient has potential possibilities for harm through the contamination of water and food supplies, which may be so far-reaching that it is but proper that cognizance be taken of each case. The same is true of tuberculosis, with the exception that its manner of spread is somewhat different. The majority of cases of this disease receive their infection from some existing human case. The disease is more or less chronic in character and the patient usually continues as a focus from which infection may be spread for months and sometimes years. If tuberculosis, which has so sorely affected mankind, is to be made a constantly diminishing factor as a cause of unnecessary sickness and premature death, the location and activities of those affected must be known that they may be properly instructed how to conduct themselves that others may not be unduly endangered, that they may learn the ethical code to which the tuberculous should conform, and that its observance may be made as effective and easy as present knowledge can make it. Yellow fever is a disease of quite another type, spread in an entirely different way, but the importance of having each case reported at the earliest possible time has made a profound impression, and deservedly so, upon those living in infectible territory. And yet the ravages of this disease by sickness and death, while more striking perhaps, are no greater than those of some other diseases which are more constantly present and which very probably might be as effectively curtailed if as strenuously combated.

The above-named diseases serve as a few commonplace examples to illustrate the fundamental need for the reporting of the preventable diseases. The general statement may be made, it is believed, that in order to prevent the undue spread of the infectious diseases of man it is necessary that existing cases be reported to some authority with power and facilities to take such measures as are necessary to prevent the spread of the infection to others; also that the reporting of cases is the only generally reliable means a community has of knowing when unusual disease conditions or epidemics exist, and when, therefore, greater effort must be made for protection. The reporting of all cases of certain diseases occurring on water sheds is necessary for the proper protection of water supplies. The reporting of all cases of sickness possible of spread through milk when they occur at places where milk is produced, handled, or distributed, is essential to prevent epidemics of milk-borne disease.

Whenever it is desired to make a careful study of the cause of an epidemic, or of an unusual prevalence of a disease, the first step is to study the known cases to find the factors which have been operative in spreading the infection. Better results would undoubtedly be attained if, instead of unusual conditions being necessary as an incentive to epidemiological studies, every health authority had the means for constantly studying the movements of disease within his jurisdiction, the exacerbation and decline of sickness, the factors operative in the causation of disease, the best methods of prevention, and the times when special effort is necessary or most effective.

COLLECTION OF REPORTS.

The regulation of the reporting of sickness comes within the police powers of the individual States. As the sanitary condition of a State affects not only the inhabitants of the State itself, but, because of interstate commercial relations made easy by good roads and rapid transit, affects neighboring States, and even those more remote, it would seem that it might reasonably be considered as having become the duty as well as the privilege of the individual States to meet the responsibility to such a degree at least as will guarantee a reasonable protection to other States. The minimum which would appear to serve this purpose would be that each State take measures to keep itself informed as to the prevalence and geographic distribution of the communicable diseases within its territory and make this information available at frequent intervals to those interested.

A State board or department of health, to be responsible for the local enforcement of State laws, must be represented locally by officials over which it has not only nominal but some actual supervision. This end has been accomplished in various ways. Some States (Massachusetts and Pennsylvania) have divided the State into health districts and placed a State representative in each. In Pennsylvania the county has practically been made the district. In Florida agents of the State board are employed in most of the counties. This gives the State board or department a representative, to a certain extent local in character. In Pennsylvania the actual local authority of the State has been carried still further, and all townships in which no township board of health has been organized are placed under employees of the State department of health, who act as local health officers. The State law requires incorporated municipalities and townships having a certain density of population (300 to the square mile) to organize local boards of health. All townships not so supplied, which in a way represent the strictly rural territory, are under the direct and immediate control of the State department of health.

In certain of the States a partial control over local boards has been obtained by the State authorities appointing a majority of the members of each local board. In Virginia the State board appoints three of the four members of each county and city board of health, and one of the three so appointed becomes the local health officer. In South Dakota the State board appoints two of the three members of each county board of health, but takes no part in the appointment of city boards. In West Virginia the State board appoints three of the five members of each county and city board of health; the three so appointed are nominated, however, by the county court in the case of counties and the council in cities. In Oklahoma the State commissioner of health appoints a county superintendent of health for each county. In Vermont the State board appoints a health officer for each town (township). In Wyoming the State board appoints the county health officers.

The health officer's knowledge of the prevalence or course of disease depends mainly upon reports made by physicians, the part played by the practicing physician being the most important factor in securing reports of sickness. Physicians have not always been prompt in doing their part. It would seem, however, that if they are to avoid the unjust criticism of not being interested in prophylaxis, they must espouse the cause of preventive medicine and become, by virtue of their humanitarian calling, ex officio assistants of the health authorities. This idea appears to have been instrumental in shaping certain of the State laws. In Alabama the Medical Association of the State of Alabama constitutes the State board of health, and elects the State health officer. The county medical society constitutes a board of health for the county, and elects the county health officer and health officers for each incorporated municipality. In Mississippi the State medical association and all medical societies in affiliation with it constitute the State department of health, and any licensed practitioner of medicine may have his name enrolled as a member of the department. In North Carolina all registered physicians in each county constitute an auxiliary board of health for the county, the function of this board being to advise the county authorities on sanitary matters. In South Carolina the State board of health consists of the South Carolina Medical Association together with certain of the State officials.

Aside, however, from a consideration of the subject on a professional ethical basis, most physicians, because of their position as citizens, would without doubt desire to conform to the law once it had occurred to them that failure to do so placed them outside the class of law-abiding citizens. It would seem that where the State issues licenses, permitting the practice of medicine, one of the most reasonable penalties which it might be expected to impose upon physicians who did not comply with the laws, would be the suspension or revocation of the license. It is believed that a considerable percentage of those who do not now feel under moral obligation to carefully and accurately report all cases required by law would do so if it were made plain that the license was granted on condition that the recipient agreed to familiarize himself with State laws relating to the public health and to obey them, and that the license would be considered valid only so long as these conditions were fulfilled.

This has been enacted into law in Utah, where it is required that whenever any licensed practitioner of medicine is guilty of willful violation of the law in regard to the reporting of infectious diseases or the registration of births and deaths his license shall be revoked or canceled. (Utah Compiled Laws, 1907, sec. 1735-36 as amended by Acts of 1911, ch. 93.)

The question naturally arises as to which diseases should be made notifiable. Opinion in the past seems to have differed considerably. The number required to be reported varies from 33 in Pennsylvania to none at all in four States. There would seem to be decided advantages in making notifiable all preventable diseases, and that these might be considered to include infectious diseases, certain parasitic diseases, occupation diseases, and certain diseases due to damaged or improper food.

The greatest need of reports of sickness, and their most important use, are for the immediate information of the health officer, that he may take such measures as are known to medical science to protect the family of the patient and the community from further and unnecessary infection or additional injury, or at least instruct them as to how this can be done. However, reports of sickness when compiled and classified become morbidity statistics which show the movement of disease, the progression, extension, recession, and periodicity of epidemics, and the effects upon disease of preventive measures and sanitary improvements.

The reporting of sickness is the foundation upon which the study of epidemiology necessarily rests, a study which will without doubt add much to existing knowledge of disease.

STATE LAWS AND REGULATIONS.

The laws and regulations of the various States relating to the reporting of sickness, and to the health authorities to and through whom the reports of cases are made, briefly abstracted and analyzed in tabular form, will be found on succeeding pages. It is desired to emphasize that these represent the requirements of State statutes and of regulations promulgated in accordance with the statutes, and are not to be understood as showing in all cases the work that is done, owing to the impossibility of enforcement of the provisions under existing conditions in some of the States. For some purposes it would have been better to have shown the measures being enforced and the extent of their enforcement, but for reasons which will be readily understood this was impossible.

There is considerable variation in the different States as to the authority to whom reports are made. The simplest and least common is where the physician makes the report direct to the State board or department of health. The most common is for the physician to report to the city health authority, if in a city, and to the township or county authority if outside of cities, and for the city and township or county authorities to report to the State department or board. In some States a third step is inserted and the local authorities report to the county health officer who in turn reports to the State. Various modifications of these schemes are also used, as will be seen by consulting the tables. The effort seems to have been made in most cases to have the physician report to the authority who would be benefited by the information and would take whatever action was necessary or possible.

The time when reports are to be made also varies. It is usually required that the physician make an immediate report; in some cases it is specified to be made within 12 or 24 hours, in others weekly, and in still others at the end of the month. Also varying requirements are made as to when the city, township, and county authorities shall report to the State. In some States these reports are made daily, in some weekly, in others semimonthly or monthly, in a few quarterly, annually, or not at all; in one or two weekly and also for the fraction of a week at the end of the month.

The variation in the laws and regulations of the States as to the manner and time of reporting, and the authorities to whom the reports are made, is such that the only method of satisfactorily showing the details seemed to be a tabular statement where the scheme adopted in each State could be shown. (See pp. 74 to 97, inclusive.)

The features peculiar to the various State laws have been noted by themselves as being of possible interest, and will be found on pages 66 to 68, inclusive.

A table showing the diseases required to be reported in each State will be found on pages 69 to 73.

ACKNOWLEDGMENT.

A copy of the proof of this publication was sent to the State health officer or secretary of the State board of health of each of the several States for criticism, and the indication of errors or omissions which might be noted. Replies containing helpful suggestions and in many instances corrections and additions were received from practically all. Many also went to great pains to forward copies of regulations and recently enacted laws.

It is a pleasure to acknowledge the assistance and cooperation of those who thus made possible a work which it is trusted will be found useful in making the various State requirements for the reporting of sickness easily accessible.

ABSTRACTS OF THE STATE AND TERRITORIAL LAWS AND REGULATIONS RELATING TO THE REPORTING OF SICKNESS AND THE HEALTH AUTHORITIES TO AND THROUGH WHOM CASES ARE REPORTED.

ALABAMA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The Medical Association of the State of Alabama is the State board of health, and elects an executive officer, known as the State health officer. (Political Code of 1907, ch. 22, Art. I.)

Counties.—The county medical societies in affiliation with the Medical Association of the State of Alabama are boards of health for their respective counties, and for all incorporated towns and cities therein, and are under the general supervision of the State board of health. The county board of health is the only local board of health. Others are prohibited. The county board elects a county health officer, and a health officer for every incorporated city and town in the county. (Ibid.)

MORBIDITY REPORTS.

Notifiable diseases.—Leprosy, cholera, typhus fever, cerebro-spinal meningitis, yellow fever, scarlet fever, plague, hydrophobia, glanders, smallpox, diphtheria, pulmonary tuberculosis, typhoid fever, chagres fever, beriberi. (Ibid., sec. 716.)

Physicians, etc.—Physicians are required to report cases of the above-named diseases occurring in their practice to the local health officer. (Ibid., sec. 714.) Midwives and other persons are to report in like manner suspected cases. (Ibid., sec. 715.)

Municipal health officers.—Municipal health officers are required to keep a "Register of infectious diseases," in which are recorded the name, age, sex, color, race, occupation, and residence of persons attacked by the above-named diseases. The presence of any of these diseases is to be reported promptly to the committee of public health of the county board of health and to the State health officer. (Ibid., sec. 710.)

County health officers.—County health officers also keep a "Register of infectious diseases," in which are recorded cases reported to them. They are required to report to the State health officer the presence of any of the reportable diseases in their respective counties. (Ibid., sec. 706.)

ARIZONA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

Territory.—The governor appoints a superintendent of public health, who, together with the governor and the attorney general, constitutes the Territorial board of health. (Acts of 1903, ch. 65.)

Counties.—The board of supervisors of the county appoints a superintendent of public health, who, with the chairman of the board of supervisors and the district attorney of the county, constitutes a county board of health, having jurisdiction outside of cities possessing a board of health. (Ibid.)

Cities.—The mayor of each city appoints two members of the city council, who, together with the city engineer and the health officer, constitute the city board of health. (Ibid.)

MORBIDITY REPORTS.

Physicians, etc.—Physicians and other persons are required to report immediately to the local board of health all cases of contagious, epidemic, or infectious diseases coming to their knowledge. (Acts of 1903, ch. 65, sec. 24.)

Keepers of private houses, boarding houses, lodging houses, inns, or hotels are required to report within 24 hours to the local board of health cases of contagious, infectious, or epidemic disease which may occur in their houses, inns, or hotels. (Ibid., sec. 26.)

Local boards of health.—It is the duty of the local boards of health whenever it comes to their knowledge that a case of smallpox, scarlet fever, diphtheria, or other infectious or contagious disease exists within their jurisdiction, to report immediately to the Territorial board of health the existence and nature of such disease. (Ibid., sec. 31.)

The county superintendent of health is to report immediately to the Territorial superintendent of health whenever any case of contagious or infectious disease occurs in his county. (Ibid., sec. 7.)

ARKANSAS.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of six commissioners of health appointed by the governor. The majority of the board consists of physicians. (Digest of Statutes, 1904, Kirby, sec. 534.) The board elects from its personnel or otherwise a person to be secretary and executive officer. (Ibid., sec. 536.)

Counties.—The several county judges may appoint county boards of health for their respective counties, these boards to be composed of three physicians. (Ibid., sec. 546.)

Cities.—In cities of the first (population over 5,000) and second (population between 2,500 and 5,000) classes the city council has the power to establish a board of health with jurisdiction extending 1 mile beyond the city limits, and for quarantine purposes, in case of epidemic, 5 miles. (Ibid., sec. 5525.)

MORBIDITY REPORTS.

The law states that it shall be the duty of the State board of health to have general supervision of the State system of the registration of prevalent diseases, and that the board shall prepare the necessary methods and forms for obtaining and preserving such records and to insure the faithful registration of the same in the several counties. The secretary of the State board of health is the superintendent of registration of vital statistics of the State. (Ibid., sec. 540.)

CALIFORNIA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a board of health consisting of seven physicians appointed by the governor. (Political Code, 1909, Deering, sec. 2978.)

Counties.—The boards of supervisors in their respective counties appoint a health officer whose duty it is to enforce the orders of the board of supervisors and the State board of health. When public necessity requires, the board of supervisors may appoint a special health officer for any unincorporated town. (Ibid., sec. 4225.)

San Francisco: The board of health consists of the mayor of the city and county, and four physicians appointed by the governor. This board elects a health officer. (Ibid., secs. 3005, 3007.)

Sacramento: The board of trustees has established by ordinance a board of health, consisting of five physicians. (Ibid., sec. 3042.)

Cities of the first class: Cities having over 200,000 inhabitants are termed cities of the first class. Those having between 100,000 and 200,000 are cities of the first and a half class. These cities are entitled the city of ———, or the city and county of ———, as the case may be, and are required to have a board of health consisting of the mayor of the city, or the city and county, and five physicians appointed by the governor. (General Laws, California, 1910, Bender-Moss Co., Act No. 2348, sec. 165.)

Cities and towns: It is the duty of the board of trustees, council, or other corresponding board, of every incorporated town and city, to establish by ordinance a board of health for the town or city, consisting of five persons, one at least of whom shall be a physician, and one, if practicable, a civil engineer. (Political Code, 1909, Deering, sec. 3061.)

The board of supervisors for each county must appoint in each unincorporated city and town having 500 or more inhabitants, a health officer. (Ibid., sec. 3062.) The county board of supervisors may appoint a special health officer for unincorporated towns when public necessity requires. (Ibid., sec. 4225.)

MORBIDITY REPORTS.

Notifiable diseases.—Cholera, plague, yellow fever, leprosy, diphtheria, scarlet fever, smallpox, typhus fever, typhoid fever, anthrax, glanders, epidemic cerebro-spinal meningitis, tuberculosis, pneumonia, dysentery, erysipelas, uncinariasis (or hookworm), trachoma, dengue, tetanus, measles, German measles, chickenpox, whooping cough, mumps, pellagra, beriberi, syphilis, gonococcus infection, rabies, poliomyelitis. (Ibid., sec. 2979a, as amended by sec. 1, ch. 250, Laws 1911.)

Physicians.—It is the duty of every attending or consulting physician, nurse or other person having charge of or caring for any person afflicted with any of the above-named diseases to report at once in writing to the local board of health or health officer the nature of the disease and name and residence of patient excepting that syphilis and gonococcus infection are to be reported by office number only. (Ibid.)

The public-health law of 1907 requires that physicians, nurses, clergymen, attendants, owners, proprietors, managers, employees, and persons living in or visiting any sick person in any hotel, lodging house, house, building, office, structure or other place where any person is ill of any infectious, contagious, or communicable disease, promptly report such fact to the city, city and county, or other local health board or health officer, giving the name of the person, if known, the place where such person is confined, and the nature of the disease. (Acts of 1907, ch. 492, sec. 16.)

Medical practitioners attending or called in to visit a patient, whom he believes to be suffering from poisoning by lead, phosphorus, arsenic, or mercury, or their compounds, or from anthrax, or from compressed-air illness, contracted as a result of the nature of the patient's employment, are required to send to the State board of health a notice stating the name, address, and place of employment of the patient and name of the disease, and for this report the practitioner is entitled to a fee of 50 cents. (The State board of health is to transmit the data thus obtained to the State commissioner of the bureau of labor statistics.) (Acts of 1911, ch. 485, secs. 1 and 3.)

Local health authorities.—It is the duty of every coroner, local health officer, and every member of the local boards of health, to report at once in writing cases of the above-named diseases and of any other contagious or infectious disease to the secretary of the State board of health. (Political Code, sec. 2979a, as amended by sec. 1, ch. 250, Acts of 1911.)

Every county health officer, and every city and county, city or town board of health, or chief executive health officer, is to report in writing to the State board of health on or before the 5th day of each month, and also whenever requested by the State board of health or its secretary all infectious, contagious, and communicable diseases in man or beast which come to his knowledge, the report to be made on blanks furnished by the State board of health. (Acts of 1907, ch. 492, sec. 11.)

Local boards of health or health officers are to report immediately by telegraph to the secretary of the State board of health every case of plague, Asiatic cholera, yellow fever, or typhus fever, and after investigation and within 24 hours are to further report the cause, source, and extent of the infection and the measures adopted in each case. (Acts of 1907, sec. 13, ch. 492, as amended by sec. 3, ch. 339, Acts of 1911.)

In addition to the diseases previously enumerated, cases of malaria are to be promptly reported to the State board of health. (Ibid.)

COLORADO.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of nine members, appointed by the governor. (Rev. Stat., 1908, ch. 115, sec. 5009.)

Counties.—The board of county commissioners of each county constitutes a board of health for the county with jurisdiction outside of cities, towns, and villages. The board appoints a health officer. (Ibid., sec. 5030.)

Incorporated cities and towns.—The mayor and council or trustees of each incorporated city and town constitute a board of health for the city or town. The board appoints a health officer. (Ibid., secs. 5031, 5032.)

MORBIDITY REPORTS.

Householders.—Whenever a householder knows that a person within his family is ill with smallpox or any other disease dangerous to the public health, he is required to report the case to the local (city or county) health officer immediately. (Ibid., sec. 5070.)

Physicians.—Physicians must report immediately to the local board of health all cases of smallpox, cholera, diphtheria, scarlet fever, or other disease dangerous to the public health occurring in their practice. They must also report the case to the householder, hotel keeper, keeper of a boarding house or tenant within whose house or rooms the sick person happens to be. The notice to the board of health must state the name of the disease, the age and sex of the person sick, the address of the patient, and the name of the physician giving the notice. (Ibid., sec. 5072.)

Local boards of health.—City and county health officers are required by law to keep the secretary of the State board of health constantly informed respecting every outbreak of a disease dangerous to the public health. (Ibid., sec. 5073.)

CONNECTICUT.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven members, six appointed by the governor, of whom three must be physicians, and one a lawyer, and a secretary chosen by the six so appointed. (General Statutes, 1902, sec. 2502.)

Counties.—The judges of the superior court appoint an attorney at law to be health officer for each county. (Ibid., sec. 2517.)

Towns (townships).—The county health officer appoints a person learned in medical and sanitary science to be health officer for each town, except in towns containing a city or borough whose limits are coterminous with the town limits. In towns containing a city or borough, whose limits are not coterminous with those of the town, the town health officer has jurisdiction in the town only outside of the limits of the contained city or borough. (Ibid., sec. 2521.)

Cities and boroughs.—The mayor of every city, and the warden of every borough is required to appoint a person learned in medical and sanitary science to be health officer for the city or borough, unless the charter of the city or borough makes other provision for the appointment of a health officer. (Public Acts, 1905, ch. 15.)

MORBIDITY REPORTS.

Physicians.—Physicians are required to report in writing every case of cholera, yellow fever, typhus fever, leprosy, smallpox, diphtheria, membranous croup, typhoid fever, scarlet fever, or of other contagious or infectious disease, except those of a venereal nature, occurring in their practice, to the health officer of the town, city, or borough in which the case occurs, within 12 hours after the nature of the disease has been recognized. (Connecticut General Statutes, 1902, title 15, ch. 150, sec. 2534.) Physicians are required to report in writing the name, age, sex, color, occupation, place where last employed, and address of all cases of tuberculosis in their practice to the health officer of the city, town, or borough within 24 hours. (Public Acts, 1909, ch. 79, sec. 1.)

The secretary of the State board of health states that, in addition to the State laws and regulations, uniform sanitary regulations have been adopted by all the towns (townships) in the State which require that physicians shall report in writing to the town health officer within 12 hours every case of cerebro-spinal fever, whooping cough, and measles, in addition to the diseases above named, and that when no physician is in attendance householders are to report cases occurring in their houses.

Hotel and lodging house keepers.—Hotel and lodging house keepers are required to report to the local board of health within 12 hours cases of malignant or contagious disease occurring in their houses. (General Statutes, 1902, sec. 2546.)

Midwives, nurses, etc.—The midwife, nurse, or attendant having charge of an infant under two weeks of age is to report in writing within six hours to the local health officer whenever the infant's eyes become reddened, inflamed, or swollen. (Ibid., sec. 2535.)

Institutions.—Officers in charge of hospitals, dispensaries, asylums, and other similar institutions, are required to report cases of tuberculosis coming under their care or observation to the local health officer within 24 hours in the same manner as practicing physicians. (Public Acts, 1909, ch. 79, sec. 1.)

Local health officers.—When in any town, city, or borough, a case of smallpox, cholera, or any epidemic of infectious disease is known to exist, the local health officer is required to immediately notify the secretary of the State board of health of the existence of the same. (General Statutes, 1902, sec. 2508.)

The health officer of every town, city, and borough is required to make a report to the State board of health on or before the 8th day of each month of all contagious diseases reported to him during the preceding month. (Ibid., sec. 2532.)

Local health officers report to the commissioner of domestic animals cases of rabies within 24 hours after receiving information of such cases. (Public Acts, 1907, ch. 170, sec. 1.)

DELAWARE.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven physicians appointed by the governor. They elect a secretary who may be a member of the board. (Laws of Delaware, vol. 19, ch. 642, sec. 1; also Rev. Stat., 1893, p. 296.)

Counties.—The governor appoints three physicians in each county to be health officers of the county. (Rev. Stat., 1893, ch. 46, p. 362.)

Cities.—It is the duty of the common council of every city and the commissioners of every incorporated town to appoint a board of health for the city or town of not less than three nor more than seven members, of whom at least one shall be a physician. (Delaware Laws, vol. 16, ch. 345, sec. 1; also Rev. Stat., 1893, p. 298.)

MORBIDITY REPORTS.

Physicians, etc.—Physicians, dentists, veterinary surgeons, or others practicing medicine or surgery or any branch thereof are required to give prompt notice to the local or State board of health of any and all cases of contagious or infectious diseases that come under their professional notice. (Acts of 1899, ch. 240, sec. 4, and Acts of 1903, ch. 327, sec. 6.)

Any physician or other person having knowledge of a case of disease dangerous to the public health which the State board of health requires to be reported is required to report the name, age, sex, and color of the patient and the place where the patient may be found to the health authority nearest to his place of residence. (Acts of 1903, ch. 328, sec. 3.)

Local health authorities.—It is the duty of the local boards of health to report to the State board of health the existence of any case of infectious or contagious disease which may come under their observation. (Acts of 1903, ch. 327, sec. 6.)

DISTRICT OF COLUMBIA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

District.—The Commissioners of the District appoint a physician as health officer. (20 Stat. L., p. 107; 1 Sup. R. S., 2d ed., p. 179.)

MORBIDITY REPORTS.

Notifiable diseases.—(1) Asiatic cholera, (2) yellow fever, (3) typhus fever, (4) smallpox, (5) leprosy, (6) the plague, and (7) glanders (29 Stat. L., p. 635), (8) diphtheria, (9) scarlet fever, (10) measles, (11) whooping cough, (12) chicken pox, (13) epidemic cerebro-spinal meningitis, and (14) typhoid fever (34 Stat. L., p. 889), (15) tuberculosis (35 Stat. L., pt. 1, ch. 165, p. 126).

Physicians or persons in charge.—Physicians or persons in charge of cases shall report immediately to the health officer cases of the diseases (1 to 7) enumerated above, giving the name of the disease, name, age, sex, and color of the person suffering therefrom, and address where located. (29 Stat. L., p. 635.)

Physician, head of family, etc.—Every person in charge of any patient suffering from any of the diseases (8 to 14) enumerated above, is required to send to the health officer a signed certificate written in ink, stating the name of the disease, the name, age, sex, and color of the person suffering therefrom, the school attended, and the address where the patient can be found. When the patient recovers or dies, the person in charge is required to send to the health officer as soon as possible an ink-written certificate of the fact.

The term "person in charge" is held to mean, first, each physician in attendance, and in the absence or default of the physician, then, second, the head of the family to which the patient belongs; third, the nearest relative present on the premises, and fourth, every person in attendance. (34 Stat. L., p. 889.)

Poliomyelitis is to be reported in the same manner as the above-named diseases 8 to 14, and, in addition, when the temperature of the patient returns to normal, or if it has not been above normal, the fact is to be reported. (Regulations, Commissioners of the District of Columbia, May 3, 1911.)

Officers having charge of hospitals, dispensaries, asylums, and similar institutions and physicians are required to report to the health officer cases of pulmonary or other communicable form of tuberculosis within one week after the disease is recognized. (35 Stat. L., pt. 1, p. 126.)

Midwives, nurses, etc.—Whenever any midwife, or any person other than a registered physician, is in attendance upon a case of childbirth, and the newly born child has inflammation of the eyes, attended by a discharge therefrom, said midwife or other person is required to report the fact in writing to the health officer, so that the report shall be received by the health officer within the six hours after the existence of the discharge becomes known. (Regulation, Aug. 25, 1911.)

FLORIDA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health of three members appointed by the governor. This board designates and employs a physician as State health officer, who is also the board's executive officer and secretary. (General Statutes, 1906, secs. 1109, 1112.)

Counties.—The State board of health is given power to make rules and regulations for the preservation of the public health (General Statutes, 1906, sec. 1120), and the supervision and regulation of municipal and county sanitation. (Laws of 1909, ch. 5931, sec. 1.) The State health officer is authorized to employ suitable persons to serve as county sanitary agents, or special agents, or in such other capacities as may be necessary to carry out the powers and duties of the State board of health. (Rule 34, Florida State board of health.) Up to June 12, 1911, there had been 41 agents appointed in 39 counties. (The State contains 47 counties.) Thirty-four counties had 1 agent each, 3 counties 2 agents each, and 1 agent served for 2 counties. (State health officer, June 12, 1911.)

Note.—Charters granted to cities by the legislature usually make provision for city health officers.

MORBIDITY REPORTS.

Physicians.—It is the duty of physicians to report immediately to the president of the State board of health by telegram, or in the most expeditious manner, every case of yellow fever, smallpox, or cholera that comes within his practice, the telegram to be paid for by the State. (General Statutes, 1906, sec. 1114.) Immediate report to be made also to the city health officer or mayor or the county physician or chairman of the county commissioners. (Ibid., sec. 1146.)

It is also the duty of physicians to report immediately to the State health officer or to an agent of the State board of health, by first mail, every case of diphtheria, leprosy, or scarlet fever which he may be called to attend. Where there is no physician in attendance upon such a case, it is the duty of any person having charge of, or in attendance upon, or upon whose premises the case occurs, to report in the same manner as required of physicians. (Rules and regulations of State board of health, 1904, rule 28.)

The State board of health in annual session in February, 1911, revised the rules and regulations of the board, and it is believed that they will be approved finally and made effective in February, 1912.[1] Rule 1 relating to the reporting of cases of sickness, as revised, reads:

Rule 1. Reports of communicable diseases.—It shall be the duty of every physician in the State of Florida to report immediately to the State health officer or to a representative of the State board of health, by first mail, every case of scarlet fever, diphtheria, measles, cerebro-spinal meningitis, anterior poliomyelitis, bubonic plague, glanders, anthrax, rabies, or leprosy, which occurs within his practice or which he may be called to attend. (Yellow fever, smallpox, and cholera are to be reported by telegram, charges collect. See section 1114, General Statutes, 1906. All other diseases should be reported by first mail, or by paid telegram.) Where there is no physician in attendance upon any case of the diseases herein mentioned, it shall be the duty of any person having charge of or in attendance upon, or upon whose premises a case of such diseases is suspected to exist, to report the same in the manner herein provided.

GEORGIA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS

State.—The law makes provision for a State board of health of 12 members, 11 of whom shall be physicians, appointed by the governor, the twelfth being the secretary. (Acts of 1903, No. 453, sec. 1.)

Counties.—The authorities of each county are authorized and requested to establish a board of health, and appoint a health officer, the board to have jurisdiction outside of municipalities. (Regulations, State board of health, 1904, secs. 46, 50.)

Cities.—The council of each incorporated city and town is authorized and requested to establish a board of health and elect a health officer. (Regulations State board of health, 1904, secs. 46, 48.)

Unincorporated cities and towns are put under the supervision of the county boards of health. (Regulations, State board of health, 1904, sec. 46.)

In case a city or county fails to establish a board of health, the State board of health may appoint a health officer for the city or county. (Regulations, State board of health, 1904, sec. 46.)

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[1] Letter of State health officer, Oct. 30, 1911.

MORBIDITY REPORTS.

Notifiable diseases.—The State board of health has declared the following-named diseases to be dangerous to the public health: Smallpox, Asiatic cholera, yellow fever, typhus fever, scarlet fever, diphtheria, and membranous croup. (Regulations, State board of health, 1904, sec. 9.)

Physicians, etc.—Physicians, householders, heads of families, county or municipal authorities aware of the existence of any of the above-named diseases are required to report them immediately to the local board of health or its proper officer. (Regulations, State board of health, 1904, sec. 9.)

Local boards of health.—It is the duty of local boards of health and of physicians in localities where there are no health authorities to report promptly to the State board of health the discovery of any of the following-named diseases: Asiatic cholera, yellow fever, scarlet fever, smallpox, diphtheria, typhus fever, typhoid fever, and such other contagious or infectious diseases, as the State board of health may from time to time specify. (Acts of 1903, No. 453, sec. 5.)

County and municipal health officers are required to keep a record of all cases of contagious or infectious diseases reported to them. (Regulations State board of health, 1904, sec. 49.)

HAWAII.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

Territory.—Provision is made for a Territorial board of health consisting of seven members appointed by the governor, four to be laymen, two physicians, and the seventh to be the attorney general. All the members serve without pay except the president of the board. (Revised Laws, 1905, sec. 988.)

The board of health may appoint suitable agents in such localities as it may deem necessary to carry into effect all regulations for the public health. (Ibid., sec. 990.)

MORBIDITY REPORTS.

Notifiable diseases.—Cerebro-spinal meningitis, Asiatic cholera, follicular conjunctivitis, diphtheria, amœbic dysentery, typhoid fever, paratyphoid fever, leprosy, measles, dengue, poliomyelitis, whooping cough, plague, scarlet fever, tetanus, trachoma, tuberculosis, typhus fever, chicken pox, smallpox, yellow fever, or any other infectious or communicable disease, or disease dangerous to the public health. (Ibid., secs. 1004, 1005, 1005A, as amended by laws of 1911, act 125.)

Physicians.—Physicians are required to report immediately to the board of health or its nearest agent in writing cases of the above-named notifiable diseases, or of any other infectious or communicable disease, or disease dangerous to the public health. In addition to the written report, cases of smallpox, scarlet fever, diphtheria, plague, cholera, yellow fever, typhus fever, cerebro-spinal meningitis, and amœbic dysentery are to be reported immediately by telephone or direct oral communication. The recovery of cases of tuberculosis is also to be reported. (Ibid., sec. 1004, as amended by laws of 1911, act 125. Also laws of 1911, act 118, secs. 7 and 15.)

Institutions.—Superintendents in charge of hospitals, dispensaries, asylums, or other similar private or public institutions are to report to the board of health or its nearest agent within 24 hours, giving the name, age, sex, nationality, occupation, place where last employed, if known, and previous address of every patient having tuberculosis who comes into their care or under their observation. (Laws of 1911, act 118, sec. 7.)

Householders, etc.—Householders, keepers of boarding and lodging houses, and masters of vessels are to report immediately to the board of health or its nearest agent any person in or about their respective houses or vessels whom they believe to be sick with a notifiable disease. Police officers are also to report immediately to the board of health or its nearest agent cases of the notifiable diseases coming under their observation. (Ibid., sec. 1005, as amended by laws of 1911, act 125, sec. 2.)

Every person.—It is the duty of every person to report to the board of health or its agent forthwith every case known or believed to be leprosy. (Ibid., sec. 1124 and acts of 1909, chap. 81, sec. 3.)

The board of health is required during the prevalence of any severe pestilence or epidemic to publish weekly a report of the public health. (Revised Laws, 1905, sec. 988.)

IDAHO.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of five members as follows: Two physicians appointed by the governor, the attorney general of the State, the State engineer, and a physician elected as secretary of the board by the other four members. (Revised Political Code, 1908, title 8, ch. 1, art. 1, p. 529.)

Counties.—The board of county commissioners and the county physician constitute a county board of health, the county physician being secretary and the executive officer of the board. (Ibid., art. 3, p. 534.)

Cities.—Rule VIII of the rules and regulations of the State board of health (May, 1909), requires that the county boards of health shall insist on the organization of municipal boards of health in incorporated towns and villages within their respective counties.

MORBIDITY REPORTS.

Notifiable diseases.—Rule X of the rules and regulations of the State board of health (May, 1909), declares the following-named diseases to be dangerous and contagious: Asiatic cholera, yellow fever, smallpox, chicken pox, typhus fever, leprosy, bubonic plague, diphtheria, scarlet fever, typhoid fever, measles (including rotheln), and whooping cough. Cerebro-spinal meningitis and "infantile paralysis" were added to this list by regulation of the State board of health October 6, 1910.

Physician, head of family, etc.—Physicians are required to report cases of the dangerous and contagious diseases in their practice in writing within 24 hours to the board of health having jurisdiction, giving the name and residence of the sick person. If there is no attending physician it is then the duty of the owner or agent of the building in which the case occurs or of the head of the family to make the report. (Rule XIV, State board of health, 1909.)

Physicians or other persons called to attend cases of smallpox, cholera, plague, yellow fever, diphtheria, membranous croup, scarlet fever, typhoid fever, or any other disease dangerous to the public health, or required by the State board of health to be reported, are required to report said cases to the health officer having jurisdiction, giving the name, age, sex and color of the patient, and the place where the patient may be found. It is also the duty of the head of the family and of the owner or agent of the owner of the building in which cases occur to give immediate notice to the health officer. (Revised Political Code, 1908, sec. 1099.)

Midwives, nurses, etc.—It is the duty of midwives, nurses, or other persons having charge to report within six hours to the local health officer or to some physician when the eyes of an infant under two weeks of age become reddened or swollen or contain pus. (Ibid., sec. 1108.)

Municipal authorities.—All health reports of municipal boards of health must be transmitted to the county board of health quarterly. (Rule IX, State board of health, 1909.)

County authorities.—The county physician is required to make a quarterly report to the State board of health, containing a summary of contagious and infectious diseases. (Rule IV, State board of health, 1909.)

ILLINOIS.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven members appointed by the governor. (Rev. Stat., 1909, ch. 126A, sec. 1.)

Counties and townships.—The board of county commissioners in counties not under township organization and the supervisor, assessor, and town clerk of every township in counties under township organization, constitute a board of health with jurisdiction outside of the limits of incorporated cities and villages. These boards have the power to appoint physicians as health officers. (Ibid., ch. 34, sec. 116, 117.)

Cities and villages.—The city council or board of trustees have jurisdiction in and over all places within one-half mile of the city or village limits for the purpose of enforcing health and quarantine ordinances and regulations. (Ibid., ch. 24, sec. 44.)

The city council in cities and the president and board of trustees in villages have the power to appoint a board of health for the respective cities and villages except in cities incorporated under special acts making other provision. (Ibid., ch. 24, sec. 62, par. 76.)

MORBIDITY REPORTS.

Physicians.—The attending physician or the householder in whose dwelling the case occurs must immediately notify the local health authorities of existing cases of smallpox, scarlet fever, diphtheria, Asiatic cholera, yellow fever, bubonic plague, glanders, anthrax, or leprosy. (Rules and regulations, State board of health, 1907, p. 83.)

Midwives and nurses.—Midwives and nurses having charge of infants under 2 weeks of age are to report in writing within six hours to the local health officer or to some physician whenever the eyes of an infant become inflamed or reddened. (Rev. Stat., 1909, ch. 38, sec. 510.)

Local health authorities.—The local health authorities are required to report immediately to the secretary of the State board of health the first case of smallpox, diphtheria, scarlet fever, Asiatic cholera, yellow fever, bubonic plague, glanders, anthrax, or leprosy occurring in any town, township, village, city, or county, and to report at least once a week the progress of outbreaks of these diseases. (Rules and regulations, State board of health, 1907, p. 83.)

Occupation diseases.—Every employer engaged in carrying on any process of manufacture or labor in which sugar of lead, white lead, lead chromate, litharge, red lead, arsenate of lead, or Paris green are employed, used, or handled, or in the manufacture of brass, or the smelting of lead or zinc, is required, as often as once every calendar month, to cause all employees who come into direct contact with the poisonous agencies or injurious processes to be examined by a competent physician for the purpose of ascertaining if there exists in any employee any industrial or occupational disease or illness, or any disease or illness due or incident to the character of the work in which the employee is engaged. Physicians making these examinations are to immediately report their findings to the State board of health. If any case of such disease is found, the report is to give the name, age, address, and sex of the employee affected, the nature of the disease or illness, and the probable extent and duration thereof, the name of the employer, and the last place of employment. If no case of such disease is found, the report shall so state. The secretary of the State board of health is to immediately forward copies of these reports received by the State board of health to the State department of factory inspection. (Act approved May 26, 1911.)

INDIANA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health of five members, of whom four are appointed by a board of appointment, consisting of the governor, secretary of State, and auditor of the State. The four so appointed elect a physician to be secretary. The secretary, by virtue of his election, is a member of the State board of health, executive officer of the board, and State health commissioner. (Burns Annotated Indiana Statutes, 1908, ch. 81, sec. 7589, Acts of 1909, ch. 144, sec. 1.)

Counties.—In every county the board of county commissioners elects a physician to be county health commissioner. The State board has the power to discharge any county health commissioner or health officer in the State. (Acts of 1909, ch. 144, secs. 3, 4.)

Cities.—In every incorporated city there is to be a department of health composed of a board of three commissioners, of whom two must be physicians. This board is to be known as the city board of health and is appointed by the mayor. This board appoints a secretary who is executive officer of the board. (Ibid.)

In counties with a population of less than 30,000 the board of county commissioners may, upon agreement with the mayor or mayors of any or all the incorporated cities within the county, consolidate the boards of health of one city, or the boards of all cities with the office of county health commissioner, and appoint a single health officer known as the county health commissioner. (Ibid.)

Incorporated towns.—The board of town trustees constitutes the board of health and appoints a town health officer. (Ibid.)

MORBIDITY REPORTS.

Notifiable diseases.—The diseases required to be reported immi, diately to the local health officer are yellow fever, smallpox, cholera-diphtheria, membranous croup, scarlet fever, measles, typhus fever, bubonic plague, leprosy, pulmonary consumption, typhoid fever, chickenpox, and whooping cough. (Rule 10, Indiana State Board of Health.)

Physicians.—Physicians and midwives are required to report immediately to the secretary of the local board of health cases of contagious or infectious disease required by the State board of health to be reported. These reports are made on forms supplied by the State board of health. In cities and towns the reports are sent to the city or town health officer. Outside of cities and towns the reports are sent to the county health officer or his deputies. If no physician is in attendance the report is to be made by the householder or person having the case in charge. (Burns Annotated Statutes, 1908, sec. 7607.)

Parents, etc.—Whenever one or both eyes of an infant under 2 weeks of age become inflamed, swollen, or reddened, or show any unnatural discharge, and no legally qualified physician is in attendance, it is the duty of its parents or caretakers to report the fact in writing within six hours to the health officer having jurisdiction. (Acts of 1911, ch. 129, sec. 3.)

Town and city health officers.—Town and city health officers enter the record of cases of infectious disease reported to them in a record book and by the 2d of each month forward the original infectious disease reports received during the preceding month to the county health commissioner. (Rule 6, Indiana State Board of Health.)

County health commissioners.—County health commissioners make a special monthly report to the State board of health by the 8th of each month for the preceding month, giving the number of cases reported of typhoid fever, scarlet fever, smallpox, diphtheria, and membranous croup. They also make quarterly reports of contagious diseases on blanks furnished by the State board. All books and documents are kept at the county seat. (Rule 1, Indiana State Board of Health.)

IOWA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of the attorney general the State veterinary surgeon, one civil engineer, and seven physicians.

The board elects a secretary, who is not a member of the board. (Iowa Code, Ch. XVI, Title XII.)

Districts.—The State is divided into eight health districts. (Ibid.)

Townships.—The trustees of each township constitute a township board of health and appoint a physician as health officer. (Ibid.)

Cities.—The mayor and council of each town or city constitute a local board of health for the town or city and appoint a physician as health officer. (Ibid.)

MORBIDITY REPORTS.

Notifiable diseases.—Scarlet fever, diphtheria, smallpox, cholera, leprosy, epidemic cerebro-spinal meningitis, poliomyelitis, plague. (Regulations, State board of health, July 21, 1911, Rules I and III.)

Physician or householder.—All cases of the above-named diseases are required to be reported immediately to the mayor of the city or town, or the clerk of the township, if outside of a city or town, by the attending physician, or in his absence, by the householder of the premises wherein the disease exists, this immediate report to be followed within 24 hours by a written notice of the case. (Ibid.)

Midwives, nurses, etc.—Persons in charge of infants are to report to the local health officer or to a physician within six hours whenever the eyes of an infant become inflamed within two weeks after birth. (Acts of 1896, ch. 57, sec. 1. See footnote, p. 123.)

Local authorities.—It is the duty of the mayor of every town and city and the clerk of every township to report to the secretary of the State board of health within 24 hours every case of the above-named diseases reported to him. All reports are to be made on postal cards in accordance with forms adopted by the State board of health.

The mayors of incorporated cities and towns and the clerks of townships are required to keep a record of all cases of contagious or infectious diseases reported to them and to forward a copy of this record for the preceding calendar year to the secretary of the State board of health by the 1st of February. (Regulations, State board of health.)

KANSAS.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health consisting of nine physicians and one other person ("preferably an attorney") appointed by the governor. The board elects a secretary, who becomes the executive officer of the board, but not a member of it. (General Statutes, 1909, sec. 8027.)

Counties.—The county commissioners of the several counties act as local boards of health for their respective counties, and each board elects a physician, who becomes ex officio a member of the board and health officer of the county. (General Statutes, 1909, sec. 8033.)

MORBIDITY REPORTS.

Physicians.—Whenever a physician knows or has reason to believe that any person whom he is called to visit, or any person sick within his knowledge without the care of a physician, is sick with or has died of cholera, smallpox, scarlet fever, diphtheria, epidemic cerebro-spinal meningitis, or any disease dangerous to the public health, he is required to give notice of the fact to the nearest board of health or health officer. (General Statutes, 1909, sec. 8074.)

Tuberculosis is declared to be an infectious and communicable disease, dangerous to the public health, and physicians are required to report cases of it to the county health officer, or in cities of the first class (cities having over 15,000 inhabitants) to the city health officer within 24 hours after he becomes aware of their existence, the report to be in writing and to give the name, age, sex, color, occupation, place where last employed, and address. Similar reports are to be made by the chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar private or public institution of cases coming under his observation. (General Statutes, 1909, sec. 8061.)

Householder.—Householders are required to give notice of cases of smallpox, cholera, scarlet fever, diphtheria, epidemic cerebro-spinal meningitis, or any disease dangerous to the public health occurring in their families. (General Statutes, 1909, sec. 8075.)

Local health officers.—Municipal and county boards of health and health officers having knowledge of any contagious or infectious disease, or of a death from such a disease, within their jurisdiction, are required to communicate without delay all information as to existing conditions to the State board of health. (General Statutes, 1909, sec. 8076.)

KENTUCKY.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of eight physicians, seven appointed by the governor, the eighth member is the secretary and executive officer and is elected by the board, of which he is ex officio a member. (Statutes, 1909, sec. 1757.)

Counties.—The State board of health appoints three physicians in each county, who, together with the county judge and one person elected by the fiscal court of each county, constitute a local board of health for the county. (Ibid., sec. 1743.)

Cities.—It is the duty of the council or board of trustees of every incorporated city and town of more than 2,500 inhabitants to appoint a board of health for such city or town, each of said boards to appoint a physician to be health officer of the city or town and executive officer and ex officio a member of the board. (Ibid., sec. 1769.)

MORBIDITY REPORTS.

Physicians and heads of families.—It is the duty of physicians to report cases in their practice, and of heads of families to report cases in their families, of cholera, smallpox, yellow fever, scarlet fever, diphtheria, and other epidemic and communicable diseases to the county board of health or to some member of the board within 24 hours. (Ibid., sec. 1743.)

County boards of health.—County boards of health are to report at least once in three months to the State board of health the nature and number of cases of the infectious, epidemic, and communicable diseases reported to them. (Ibid., sec. 1743.)

LOUISIANA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven physicians appointed by the governor. (Revised Laws, Wolff, 1904, vol. 2, p. 1440.)

Parishes (*counties*).—The police jury of each parish is required to appoint a parish board of health of three members, of whom one shall be a physician and two shall be members of the police jury, the physician to be the health officer and chairman of the board. (Ibid.)

Cities.—The legislative body of each incorporated municipal government is required to appoint five persons to be members of the town or city board of health. The chairman of the board is health officer. (Ibid.)

For the cities of Shreveport and Baton Rouge, the governor appoints three members and the council two members of the board of health. (Ibid.)

MORBIDITY REPORTS.

Physicians, etc.—Physicians are required to report within 24 hours to the local board of health all cases of contagious disease in their practice, stating the state of the disease, and the patient's place of dwelling and name, if known. (Louisiana Sanitary Code, 1909, Ch. III.)

The phrase "contagious disease" is declared to include diseases of an infectious, contagious, or pestilential nature. (Ibid.)

The following-named diseases are declared to be communicable and dangerous to the public health: Smallpox, cholera, diphtheria, typhoid fever, typhus fever, yellow fever, cerebro-spinal meningitis, relapsing fever, epidemic dysentery, rabies, glanders, charbon, tuberculosis, bubonic plague, leprosy, scarlet fever, measles, pneumonia, dengue.[1] (Ibid.)

Whenever a case of variola or varioloid breaks out in any community of the State, it is the duty of the attending physician, or in the absence of one, of the head of the household, or manager of the hotel, lodging house, or camp where the case may occur, to immediately notify the health officer having jurisdiction, and in the absence of such health officer, to notify the president of the State board of health. (Ibid.)

Physicians are to report cases of consumption in their practice immediately to the municipal or parish health officer on blank forms furnished by the State board of health. (Ibid.)

Cases of pneumonia are to be reported promptly to the local health officer by the attending physician, or in his absence by the head of the household. (Ibid.) Dengue and yellow fever are to be reported promptly by the attending physician. (Ibid, Ch. IX.)

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[1] The relationship of this list of diseases declared to be communicable, and dangerous to the public health to the preceding declaration that the phrase "contagious disease" shall be held to include diseases of an infectious, contagious, or pestilential nature is not clear.

Midwives, nurses, etc.—Persons other than physicians are to report cases of inflamed eyes in newborn children to the town or parish health officer within 12 hours. (Ibid., Ch. III.)

Local health authorities.—The parish health officer is to countersign the reports of cases of consumption received by him and forward them to the State board of health quarterly. (Ibid., Ch. III.)

Municipal and parish health officers are to immediately notify the president of the State board of health of cases of dengue, or yellow fever. (Ibid., Ch. IX.)

The local board of health is to report weekly to the State board, unless otherwise ordered, the progress of any of the quarantinable diseases which may be present in its jurisdiction. (Ibid, Ch. III.)

State board of health.—Whenever a quarantinable disease breaks out in any community of the State, it is the duty of the president of the State board of health to immediately notify the health authorities of surrounding States and the Surgeon General of the Public Health and Marine-Hospital Service. (Ibid., Ch. III.)

MAINE.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—Provision is made for a State board of health consisting of six members appointed by the governor, and a secretary elected by the six members so appointed. The secretary is a member of the board and its executive officer. (Rev. Stat., 1903, ch. 18, sec. 1.

Towns (townships).—The law provides for a board of health of three members appointed by the town (township) authorities in each organized town (township). (Rev. Stat., ch. 18, sec. 24.)

Cities.—Provision is made for a board of health of three members appointed by the municipal authorities in each city. (Ibid.)

MORBIDITY REPORTS.

Physicians and householders.—Householders are required to report cases of the following diseases occurring within their families or households: Smallpox, diphtheria, scarlet fever, cholera, typhus fever, typhoid fever, cerebro-spinal meningitis, measles, membranous croup, and whooping cough. (Poliomyelitis was added January 10, 1911, Regulations State board of health.) Notice is to be given to the health officer of the town either at the office of the health officer or by mail within 24 hours. In the absence of a health officer the report is to be made to the secretary of the local board of health. Physicians are to report cases of the above-named diseases occurring in their practice within 24 hours to the same authority. (Rev. Stat., 1903, ch. 18, secs. 33, 36.)

Physicians are required to report in writing on forms furnished by the State board of health the name, age, sex, color, occupation, place where last employed, and address of every person known by them to have tuberculosis, to the secretary of the State board of health within 48 hours after such fact comes to their knowledge. (Laws 1909, ch. 78, sec. 2.)

Institutions.—It is also the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, sanatorium, or other similar private or public institution to report in like manner to that prescribed for physicians, every patient having tuberculosis who comes into his care, or under his observation, within 48 hours, and also to state the previous address of the patient and to notify the secretary of the State board of health of changes in address of tuberculous patients who are or have lately been under his care. (Laws 1909, ch. 78, sec. 2.)

Midwives, nurses, etc.—When one or both eyes of an infant under four weeks of age become reddened or inflamed it is the duty of the midwife, nurse, or person having charge to report the fact at once to a legally qualified practitioner of medicine. (Rev. Stat., 1903, ch. 18, sec. 90.)

Local health authorities.—Local boards of health are required to report promptly to the State board of health every case of smallpox, varioloid, diphtheria, scarlet fever, typhoid fever, cerebro-spinal meningitis, measles, membranous croup, whooping cough, and pulmonary tuberculosis occurring within their respective jurisdictions. (Rev. Stat., 1903, ch. 18, sec. 30.)

State.—The State board of health is to keep a register of persons affected with tuberculosis. (Laws 1909, ch. 78, sec. 1.)

MARYLAND.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven members, as follows: Four members, of whom one shall be a civil engineer, and three shall be physicians appointed by the governor, the attorney general of the state, and the commissioner of health of the city of Baltimore, the seventh member to be the secretary of the board. (Poe's Public General Laws, 1904, art. 43, p. 1192.) The State board of health and the bureaus under it are designated the State department of health. (Acts of 1910, ch. 560.)

Counties.—The board of county commissioners constitutes a local board of health in each county with jurisdiction throughout the county, except in cites and towns having charters inconsistent with such extension of jurisdiction. Each county board of health is to appoint a physician as county health officer, who thus becomes secretary and executive officer of the board. (Public General Laws, 1904, art. 43, secs. 22, 23.)

MORBIDITY REPORTS.

Physicians.—Physicians are to report immediately in writing to the board of health of the "city, town or county" in which the disease exists, cases of the following-named diseases occurring in their practice: Smallpox, diphtheria, membranous croup, scarlet fever, typhoid fever, typhus fever, yellow fever, measles, whooping cough, and any other contagious or infectious disease dangerous to the public health. (Ibid., sec. 51.)

Physicians are to report cases of pulmonary and laryngeal tuberculosis coming under their care to the secretary of the State board of health within seven days, upon blanks furnished by said board, the report to give the name, age, sex, color, occupation, social condition, and residence of the person affected. (Ibid., sec. 58.)

Institutions.—The superintendent or other person in charge or control of any hospital, dispensary, school, reformatory, or other institution deriving the whole or any part of its support from the public funds of the State, or of any city, town, or county in the State, having in charge or custody or under care persons suffering with pulmonary or laryngeal tuberculosis is to make, or cause to be made, within 48 hours a record of the name, age, sex, color, occupation, social condition, and residence of the persons affected, these records to be forwarded to the State board of health on Monday of the week immediately following that in which the records are made. (Ibid, sec. 57.)

Householders.—Whenever a householder knows that a person within his family or house is sick with smallpox, diphtheria, membranous croup, scarlet fever, typhoid fever, typhus fever, measles, mumps, whooping cough, or any other infectious or contagious disease dangerous to the public health, he is to immediately give notice of the fact to the board of health of the "city or county" in which he dwells. (Ibid., sec. 50.)

Midwives, nurses, etc.—Midwives, nurses, or other persons in charge of infants under two weeks of age are required to report immediately to the local health officer or to a physician whenever one or both eyes of the infant become reddened or inflamed. (Ibid., art. 27, sec. 231.)

Hotel keepers, etc.—Hotel keepers, keepers of boarding houses and lodging houses, superintendents, managers, or directors of private or public institutions of any kind are to report any cases of known or suspected smallpox, cholera, yellow fever, typhus or typhoid fever, scarlet fever, leprosy, or any other infectious or contagious disease occurring on the premises under their management or control immediately in writing to the health officer of the city or town, or, in the absence of a local health officer, to the secretary of the State board of health. (Ibid., art. 43, sec. 67.)

Local health authorities.—The boards of health of "cities, towns, and counties" are to keep a record of the reports of disease made to them. (Ibid., art. 43, sec. 52.) When any board of health has had notice of the occurrence of a case of smallpox or any other contagious or infectious disease dangerous to the public health it is to notify the State board of health within 24 hours. (Ibid., art. 43, sec. 53.)

State.—The State board of health is to keep a register of all persons in the State known to be affected with tuberculosis. (Ibid., sec. 56.)

Pursuant to the preceding, local boards of health report once a month cases of smallpox, diphtheria, typhoid fever, scarlet fever, measles, whooping cough, mumps, and other diseases. (Secretary State board of health.)

Local health officers are also to promptly notify the secretary of the State board of health of the existence of any epidemic or any unusual sickness or mortality that may come to their knowledge within their respective jurisdictions or contiguous thereto. (Public General Laws, 1904, art. 43, sec. 29.)

MASSACHUSETTS.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health consisting of seven members appointed by the governor. (Revised Laws, 1902, ch. 75, sec. 1.)

Health districts.—The State board of health was required by an act passed in 1907 to divide the State into not more than 15 districts, to be known as health districts, and to appoint in each district a State inspector of health for the district. The State inspectors of health are under the general supervision of the State board of health. (Acts of 1907, ch. 537, secs. 1, 2, and 4, as amended by Acts 1910, ch. 523.) The State is divided into 14 health districts. (Secretary State board of health.)

Towns (townships).—Each town "may" elect a board of health of three members. If this is not done the selectmen act as a board of health. (Acts of 1907, ch. 560, sec. 366.)

Cities.—In each city except Boston the board of health is to consist of three persons appointed by the mayor, one of whom must be a doctor of medicine, and no one of whom is to be a member of the city council. (Revised Laws, 1902, ch. 75, p. 657.) This does not apply to cities whose charters make other provision for boards or departments of health.

MORBIDITY REPORTS.

Notifiable diseases.—The State board of health is directed to define what diseases shall be deemed to be "dangerous to the public health." (Acts of 1907, ch. 183, sec. 1.)

The State board therefore on August 1, 1907, declared the following diseases to be "dangerous to the public health" and therefore notifiable: Actinomycosis, Asiatic cholera, cerebro-spinal meningitis, diphtheria, glanders, leprosy, malignant pustule, measles, scarlet fever, smallpox, tetanus, trichinosis, tuberculosis, typhoid fever, typhus fever, varicella, whooping cough, yellow fever. Anterior poliomyelitis, ophthalmia neonatorum, and trachoma were added in 1909.

Householders.—A householder who knows that a person in his family or house is sick of smallpox, diphtheria, scarlet fever, or any other infectious or contagious disease declared by the State board of health to be dangerous to the public health is required to forthwith give notice thereof to the board of health of the city or town in which he dwells. (Acts of 1907, ch. 480, sec. 1.)

Nurses.—Whenever one or both eyes of an infant become inflamed, swollen and red, and show an unnatural discharge at any time within two weeks after its birth, it is the duty of the nurse, relative or other attendant having charge of the infant to report the fact in writing within 6 hours thereafter, to the board of health of the city or town in which the parents of the infant reside. (Ibid.)

Physicians.—Physicians are required to give immediate notice of cases of dangerous diseases to the local authorities. If a physician knows that a person whom he is called to visit is infected with smallpox, diphtheria, scarlet fever, or any other disease declared by the State board of health to be dangerous to the public health, or if one or both eyes of an infant whom or whose mother he is called to visit become inflamed, swollen and red, and show an unnatural discharge within two weeks after the birth of such infant, he is required to immediately give notice of the fact in writing over his signature to the selectmen or board of health of the town. (Ibid, sec. 2.)

Local health authorities.—The boards of health of cities and towns are required to report to the State board of health within 24 hours all cases which are reported to them of the diseases declared by the State board to be dangerous to the public health, and to give the name and location of each patient. (Ibid, sec. 3.)

If a local board of health refuses or neglects to make these reports, the city or town forfeits its claim upon the Commonwealth for the payment of expenses for the care and management of cases of the diseases dangerous to the public health, as provided in section 1, chapter 213, acts of 1902. (Revised Laws, ch. 75, sec. 53.)

MICHIGAN.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health of seven members appointed by the governor. (Compiled Laws, 1897, sec. 4397, and Laws of 1905, Act 18, sec. 4.)

Townships.—The township board constitutes a board of health. The supervisor is president and the township clerk is clerk of the board. Every board of health appoints a health officer, a physican being appointed where practicable. (Compiled Laws, 1897, sec 4410, 4411.)

Cities and villages.—The mayor and aldermen of each incorporated city, and the president and council or trustees of each incorporated village, in which no board of health is organized under its charter, exercise all the powers and perform all the duties of a board of health within the limits of the city or village. (Ibid., sec. 4459.)

MORBIDITY REPORTS.

Notifiable diseases.—In compliance with section 1, Act 293, Public Acts 1909, authorizing the State board of health to designate what diseases are dangerous, communicable diseases, and what diseases are contagious diseases, and making it the duty of every local board of health and health officer to observe such rules in relation to the dangerous communicable and the contagious diseases as may be prescribed by the State board, the following-named diseases are by regulation declared dangerous, communicable diseases, contagious and infectious in character and dangerous to the public health: Pneumonia, tuberculosis, typhoid fever, meningitis, diphtheria, whooping cough, scarlet fever, measles, and smallpox. Cases of each of these diseases must be reported by the attending physician or householder to the local health officer, who in turn must report them to the State board of health.

The regulation also states that the following-named diseases shall be reported for statistical purposes: Tetanus, rabies, cancer, erysipelas, and leprosy.

Physicians.—Whenever a physician knows that any person whom he is called to visit or who is brought to him for examination, is infected with smallpox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he is required to immediately give notice thereof to the health officer of the township, city or village, and to the householder, hotel keeper, keeper of a boarding house or tenant within whose house or rooms the sick person may be. The report to the health officer must state the name of the disease and the name, age, and sex of the person sick, and must designate by street and number or otherwise, the house or room in which the person is sick. (Ibid., sec. 4453.)

For this report the physician is entitled to the sum of 10 cents. (Ibid., sec. 4454.)

Every physician attending or called upon to treat a patient whom he believes to be suffering from poisoning from lead, phosphorus, arsenic, or mercury, or their compounds, or from anthrax, or from compressed-air illness, contracted as a result of the nature of the patient's employment, is required to send to the State board of health, who is to transmit to the commissioner of labor, a notice stating the name, post-office address, and place of employment of the patient, the length of time of such employment, and the disease from which in the opinion of the physician the patient is suffering. (Laws of 1911, act 119, sec. 1.)

Householders, etc.—Whenever any householder, hotel keeper, keeper of a boarding house or tenant knows or is informed by a physician or has reason to believe that any person in his family, hotel, boarding house, or premises is taken sick with smallpox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he is required to immediately report the case to the local health officer. (Ibid., sec. 4452.)

Midwives, nurses, etc.—Midwives, nurses, or other persons in charge of infants are required to report in writing within six hours after its discovery to the local health officer or some legally qualified practitioner of medicine whenever one or both eyes of an infant become inflamed or swollen or reddened, or whenever any pus or secretion forms in the eyes or upon the edge of the lids at any time within two weeks after birth. (Ibid., sec. 4475.)

Tuberculosis.—Tuberculosis is declared to be an infectious and communicable disease. Physicians are required to report to the local health officer within 24 hours, in writing, the name, nationality, age, sex, color, occupation, place where last employed, and address of every person known by the physician to have tuberculosis, also the occupation at the time the disease was contracted and the date thereof, as near as can be, the time thereafter continued at such occupation, and all subsequent occupations and the term of each up to the time of death or recovery of the patient. It is also made the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar private or public institution to report in like manner, and in addition give the previous address of the cases of tuberculosis coming into his care or under his observation. (Laws of 1909, Act 27, secs. 1 and 12a, as amended by Act 317; Laws of 1909, and Act 80, Laws of 1911.)

It is the duty of the attending physician to report to the local health officer whenever a person having tuberculosis recovers therefrom. (Ibid., sec. 12.)

It is the duty of local health officers to record all reports of cases of tuberculosis, including the results of examinations showing the presence of tubercle bacilli, in a register furnished by the State board of health and to forward to the State board of health a copy of this register quarterly. The registers are not open for inspection except to the health authorities. (Ibid., sec. 4.)

The State board of health shall, when it receives the full quarterly report, compile such report to show the number of cases and the location of each case, the number of deaths and the number of recoveries, the age, sex, and color, and the occupation at the time the person contracted the disease, and all subsequent occupations and the term of each up to death or recovery, and shall classify them to show the percentage of deaths in each trade or occupation from tuberculosis, these compilations to be published annually in the reports of the State board. (Ibid., sec. 12a.)

Local health officers.—Whenever the health officer of any township city, or village, receives notice or otherwise has good reason to believe that there is in his jurisdiction a case of smallpox, diphtheria, scarlet fever, or other communicable disease dangerous to the public health, it is his duty to keep the secretary of the State board of health constantly informed respecting the outbreak. (Compiled Laws, 1897, sec. 4460.)

MINNESOTA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of nine members appointed by the governor. The board elects a secretary who is the executive officer of the board and may or may not be one of its members. The board exercises general supervision over all health officers and boards. (Revised Laws, 1905, sec. 2127–2130.)

Counties.—The county board elects two of its members and a resident physician to constitute a board of health for each county with jurisdiction over all unorganized towns therein. At least one member of every local board must be a physician and act as local health officer and executive of the board. (Ibid., sec. 2134.)

Townships.—Every township board of supervisors constitutes a board of health for the township, and has jurisdiction over every village within its boundaries in which no organized board of health exists. The board of supervisors must appoint a physician to act as health officer. (Ibid., sec. 2134.)

Cities and villages.—Villages may and cities must provide by ordinance for the establishment of a board of health. In the absence of such provision in any city, the State board may appoint three persons to act as a board. One member of every local board must be a physician and act as health officer. (Ibid., sec. 2134.)

MORBIDITY REPORTS.

Physicians.—Physicians are to report immediately to the local health officer cases of the following diseases coming under their care: Smallpox, epidemic cerebro-spinal meningitis, epidemic anterior poliomyelitis, scarlet fever, diphtheria, measles. (Regulations, Minnesota State Board of Health, June 15, 1910.)

Cases of tuberculosis and typhoid fever are to be reported to the State board of health on blanks furnished for the purpose, within one week after the patient comes under treatment, except that in cities and villages where physicians are required by ordinance or regulation to report such cases to the local board of health they are not required to also report them directly to the State board of health provided the local health officer makes returns of all such cases reported to him to the State board of health once a month on blanks furnished for the purpose. (Ibid.)

Midwives, nurses, etc.—Persons in charge of infants under 2 months of age are to report to the local health officer in writing within 12 hours whenever the eyes of such infant become inflamed. (Ibid.)

Local health officer.—Local health officers are to report immediately to the secretary of the State board of health cases of the following-named diseases occurring within their respective jurisdictions: Smallpox, scarlet fever, diphtheria, epidemic cerebro-spinal meningitis, anterior poliomyelitis, measles, typhoid fever and tuberculosis. (Ibid.)

MISSISSIPPI.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—Department of public health: The Mississippi State Medical Association, and all other State, district, and county medical societies and associations of the State in affiliation with the purposes of its organization are constituted the Mississippi Department of Public Health. Any licensed practitioner of medicine may on application have his name enrolled as a member of said department. (Mississippi Code, 1906, sec. 1640.)

Board of health.—The State board of health consists of 13 physicians appointed by the governor. (Ibid, sec. 2482.) The board elects a president and a secretary from its members. (Ibid., sec. 2484.) It may remove county health officers from office. (Ibid., sec. 2490.)

Counties.—It is the duty of the bureau of vital statistics of the State department to appoint a county board of health in each county, consisting of one physician from each supervisor's district, for the purpose of collecting vital, mortuary, and sanitary statistics. The county health officer is chairman of the board. The county board "may" keep books of register for births, deaths and infectious disease. (Ibid., sec. 1645.)

The State board of health appoints in each county a physician to be county health officer. If interior counties do not want a health officer, the State board of health need not appoint one. (Ibid., sec. 2491.)

Cities.—Any municipality "may" establish a board of health and pass sanitary laws not inconsistent with the rules and regulations of the State board of health. (Ibid., sec. 2505.)

MORBIDITY REPORTS.

Physicians.—Physicians are required to report immediately to the secretary of the State board of health every case of yellow fever, cholera, dengue, smallpox, or other virulent, epidemic, contagious disease occurring in their practice, unless the State board of health directs otherwise. (Ibid., sec. 2498.) Physicians are also to report to the secretary of the State board of health all cases of tuberculosis, consumption, or other pulmonary diseases in their practice within 10 days. (Acts of 1910, ch. 130, sec. 1.)

MISSOURI.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of seven members, appointed by the governor. At least five of the members are required to be physicians. (Annotated Statutes 1906, secs. 7518, 7519.)

Counties.—There is a county board of health in each county, consisting of the judges of the county court, and a physician appointed by them. This board has jurisdiction outside of incorporated cities and towns. The county boards are subsidiary to the State board. (Ibid., sec. 7529A.)

Cities.—St. Louis: Provision is made for a health department controlled by a board of health and a health commissioner. The health commissioner is appointed by the mayor. The board of health consists of the mayor, the presiding officer of the council, a commissioner of police, the health commissioner, and two physicians. (City charter, Art. XII.)

Cities of the first class (population between 75,000 and 150,000): Provision is made for a health department in all cities of the first class, this department to be under the control of a board of health consisting of the mayor and three members appointed by him. One member, but not more than one member, of the board must be a medical practitioner. (Laws, 1909, secs. 291, 292.)

MORBIDITY REPORTS.

County health officer.—It is the duty of the county health officer to immediately report to the secretary of the State board of health cases of the following-named diseases, whenever they occur within his jurisdiction: Smallpox, diphtheria, membranous croup, scarlet fever, typhus fever, yellow fever, cholera, bubonic plague, and leprosy. (Regulations, State board of health, Rules I and II.)

It is the duty of the secretary of the county board of health to report quarterly to the secretary of the State board of health, "the number of contagious diseases and the results during the past quarter." These reports are to be made on the 1st of March, June, September, and December, and are to conform to the blanks furnished by the secretary of the State board of health. (Ibid, Rule 12.)

MONTANA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The governor appoints three physicians who, together with the governor, attorney general, and State veterinarian, constitute the State board of health. The board elects a physician as secretary, who becomes a member of the board, its executive officer, and the State health officer. (Revised Codes, 1907, sec. 1474.)

Counties.—The board of county commissioners and one physician whom they appoint, constitute the county board of health. The physician so appointed becomes secretary of the board, and county health officer. (Ibid., sec. 1492.)

Cities and towns.—The municipal authorities of each incorporated city and town appoint a board of health of three members, one of whom must be a physician; except that incorporated towns of less than 5,000 inhabitants may place themselves under the care of the county board of health, in which case the jurisdiction of the county health officer includes the town. (Ibid., sec. 1484.)

MORBIDITY REPORTS.

Notifiable diseases.—The communicable diseases are designated as smallpox, diphtheria, scarlet fever, cholera, plague, yellow fever, "spotted" or "tick" fever, typhus fever, typhoid fever, cerebrospinal meningitis, and measles. (Ibid., sec. 1500.)

Householders.—Householders are required to report immediately to the health officer of the town or city or county in which they reside cases of any of the communicable diseases within their families or households. (Ibid., sec. 1501.)

Physicians.—Physicians are required to report cases of the communicable diseases in their practice immediately to the health officer of the city or town, or if not in a city or town, then to the county health officer. (Ibid., sec. 1502.)

Local health officers.—Local and county health officers are required, on or before the 5th day of each month, to forward to the secretary of the State board of health, on blanks provided for the purpose, a report of all communicable diseases reported to them during the preceding calendar month. (Ibid., sec. 1495.)

NEBRASKA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of the governor, the attorney general, and the superintendent of public instruction. The governor appoints four physicians to be secretaries. (Compiled Statutes, 1909, secs. 4315, 4317.)

Counties.—The law provides that the county board of supervisors or commissioners in each county shall establish a board of health, one member of which shall be a physician, the board of health to have jurisdiction throughout the county except in cities and villages having power to establish boards of health. (Ibid., sec. 4401.)

Cities.—Cities of over 100,000 population have a health commissioner. Cities of less than 100,000 population have power to create a board of health. (Ibid., secs. 894, 1246.)

MORBIDITY REPORTS.

Physicians.—Physicians residing or practicing within the limits of any city, town, or township are required to report to the local board of health within 24 hours by the most expedient method cases of Asiatic cholera, yellow fever, smallpox (or varioloid), diphtheria (membranous croup), scarlet fever (scarlet rash or scarlatina), measles, typhus fever, ophthalmia neonatorum, typhoid fever, cerebro-spinal meningitis, leprosy, whooping cough, chicken-pox, tuberculosis, puerperal fever, or any other disease contagious or dangerous to public health. Where no physician is in attendance the responsibility for reporting the case falls upon any person having charge, or the head of the family, or any person having the care or custody of any lodging rooms in which cases occur. School teachers are also to report to the local board of health cases of the above-named diseases. Where no local board of health is organized all the reports provided for above are to be made to the State board of health. (Rule 1, Regulations State board of health, promulgated in compliance with sec. 6, art. 7, ch. 55, Rev. Stat., 1903.)

Local boards.—Local boards of health are required during the prevalence of any of the diseases named in the preceding paragraph to make adequate report from time to time to the State board of health, giving the nature of the diseases and the number of cases. (Ibid., Rule 3.)

It is the duty of all boards of health to report to the State board of health promptly the existence of any one of the following diseases: Asiatic cholera, yellow fever, smallpox, scarlet fever, diphtheria, typhus fever, typhoid fever, and such other contagious and infectious diseases as the State board of health may from time to time specify. (Compiled Statutes, 1909, ch. 55, § 4404, sec. 8.)

NEVADA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of a president and a secretary appointed by the governor and a third member appointed by the governor and the president and secretary of the board. (Laws of 1911, ch. 199, sec. 1.)

Counties.—In each county there is a board of health consisting of the county physician, the sheriff, and the board of county commissioners. The county physician acts as chairman of the board. (Laws of 1905, ch. 42, sec. 1.)

Cities.—In incorporated cities and towns the city council has the power to create a board of health and prescribe its powers and duties. (Laws of 1907, Ch. CXXV.)

The boards of county commissioners have the power to establish and maintain a board of health in any town or city in their respective counties. (Laws of 1903, Ch. XXXVIII.)

MORBIDITY REPORTS.

There is no State law requiring the reporting of cases of sickness.

NEW HAMPSHIRE.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of the governor, the attorney general, three physicians, and a civil engineer, the last four named being appointed by the governor. The board appoints a physician as secretary and executive officer of the board. The secretary may be a member of the board. (Public Statutes, 1891, ch. 107, secs. 1, 2.)

Towns (townships).—The selectmen of each town are required to appoint a board of health, consisting of three persons, of whom at least one shall, whenever practicable, be a physician in active practice in the town. (Acts of 1897, ch. 45, sec. 1 as amended by sec. 1, ch. 65, Laws of 1899.)

Cities.—All powers vested in the board of health of towns is in cities vested in the city council. (Public Statutes, 1891, ch. 50, sec. 9.)

MORBIDITY REPORTS.

Physicians.—It is the duty of every physician who attends upon any person infected with smallpox, malignant cholera, diphtheria, scarlet fever, or other malignant pestilential disease to immediately report the same to the health officers, or, in their absence, to the selectmen of the town. (Acts of 1901, ch. 13, sec. 1.) Similar report is to be made in the event of suspected cases of smallpox. (Acts of 1903, ch. 45, sec. 1.)

It is also the duty of every physician practicing medicine or surgery to report in writing to the State board of health, within one week after the disease is recognized, on forms provided by said board, the name, age, sex, color, occupation, and address of every person under his care who in his opinion is infected with pulmonary or other form of tuberculosis. It is also the duty of the officer having charge for the time being of each and every hospital, dispensary, asylum, or other public or private institution, to report in like manner, the name, age, sex, color, occupation, and last address of every person in his care or who has come under his observation, within one week of such time, who in his opinion is infected with pulmonary or other form of tuberculosis. Physicians are also to report the recovery of cases of tuberculosis to the State board of health. (Acts of 1911, ch. 6, secs. 1 and 5.)

Householders and others.—Whenever any person knows, or has reason to believe, that any member of his family or household (boarder, roomer, or visitor) has either smallpox, diphtheria, membranous croup, scarlet fever, typhoid fever, measles, or any other malignant communicable disease, he is required to give notice within 24 hours, if no physician is in attendance, to the local board of health of the town or city in which he resides. Such notice may be given either verbally or in writing. (Acts of 1901, ch. 16, sec. 2.)

Upon the appearance of smallpox, typhoid fever, or any other dangerous, communicable disease in any unincorporated locality in the State, it is made the duty of any person having knowledge thereof immediately to notify the State board of health of the appearance of such disease, provided there is no local board of health having jurisdiction in the locality. (Acts of 1911, ch. 17, sec. 1.)

Local board of health.—Upon the appearance of any of the diseases named in the preceding paragraph in any town or city, the board of health is required to make an immediate report to the State board of health, upon blanks furnished for the purpose, and to thereafter make a weekly report as long as the disease continues, stating the number of cases, the number of infected houses, the fatality, and such other facts as may be required by the State board. (Ibid., sec. 5.)

State board of health.—The State board of health is required to keep a register of all cases in which the tubercle bacilli has been found present. This register is not to be open to inspection in such manner as to reveal the identity of the patient, except to a health officer. The recovery of cases is also to be recorded in the register. (Acts of 1911, ch. 6, sec. 3–5.)

NEW JERSEY.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—Provision is made for a State board of health composed of six persons appointed by the governor, one of whom must be a physician, and becomes secretary of the board. (Act approved Mar. 31, 1887, sec. 1 as amended by sec. 1, ch. 299, Laws of 1908.)

Townships.—In each township the township committee, the township assessor, and one physician appointed by the township committee constitute a board of health for the township. (Laws of 1887, ch. 68, sec. 10.)

Cities.—Every city, borough, and town is required to have a local board of health. (Ibid., sec. 9.)

MORBIDITY REPORTS.

Physicians, etc.—Every physician is required to report within 12 hours to the local board of health having jurisdiction, or in the absence of such board to the assessor of the township, all cases of the following named diseases occurring in his practice: Cholera, yellow fever, typhus fever, leprosy, plague, trichinosis, smallpox, varioloid, typhoid fever, diphtheria, membranous croup, scarlet fever, malaria, tuberculosis in any of its manifestations, trachoma, rabies, glanders, anthrax, chickenpox, poliomyelitis, or any other contagious, infectious, or communicable disease which the State board of health may declare to be preventable and specially dangerous to the public health. The report is to be in writing, signed by the physician, and to include the name, age, and location of the person suffering from the disease. (Acts of 1911, ch. 381, sec. 1.)

When no physician is in attendance, the case is to be reported within 12 hours by the house owner or householder in whose dwelling or building it occurs. (Ibid.)

Physicians are to report in writing to the local board of health of the city, borough, town, or other municipality the name, age, sex, color, occupation, place where last employed, if known, and address of every person known by them to have tuberculosis. The report is to be signed and is to be made within 48 hours after the fact comes to the knowledge of the physician. Similar reports including the previous address are to be made within 48 hours by the chief officer having charge for the time being of any hospital, asylum, prison, or other private or public institution, of every patient having tuberculosis who comes under his care or observation. (Acts of 1910, ch. 169, sec. 1.)

Every physician who attends any person sick with typhoid fever, dysentery, scarlet fever, diphtheria, or tuberculosis on any dairy premises where milk is produced for sale or distribution, or in a household any member of which is employed at such a dairy, is required to report the case within 12 hours after his first attendance, to the State board of health, giving the nature of the disease, the name of the person sick, and his place of residence. (Acts of 1911, ch. 380, secs. 1–2.)

Midwives, nurses, etc.—Ophthalmia neonatorum: When one or both eyes of an infant become inflamed, swollen, or reddened, or show any unnatural discharge at any time within two weeks after birth and no legally qualified practitioner of medicine is in attendance upon the infant at the time, it is the duty of the midwife, nurse, attendant, or relative having charge of the infant, to report the case in writing to the local board of health of the city, township, or other municipality within six hours. (Acts of 1895, Ch. CXVIII, sec. 1; also General Statutes, 1895, p. 1676, sec. 1.)

Local health authorities.—Reports of disease made by physicians in pursuance to section 1, chapter 381, Acts of 1911, cited above, are to be entered in a book kept for the purpose by the officer receiving them. This officer is also required to transmit by mail to the State board of health a transcript of the reports received by him at least once a week, and daily when required by the State board. (Acts of 1911, ch. 381, sec. 2.)

NEW MEXICO.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

Territory.—Provision is made for a board known as the New Mexico Board of Health and Medical Examiners, and composed of seven physicians appointed by the governor. This board elects one of its members secretary. (Acts of 1907, ch. 34, sec. 1, as amended by ch. 99, Acts of 1909.)

Counties.—The board of county commissioners in each county annually contracts in writing with some reputable physician to be county health officer. The health officer so appointed is subject to the orders of the board of county commissioners, and may with the board's consent appoint as many assistant health officers as the public health and safety require. (Acts of 1909, ch. 99, sec. 4.)

Cities.—The mayor and council, trustees or other governing bodies of incorporated cities and towns constitute a board of health for the city or town. (Laws of 1901, Ch. XVII, sec. 25.)

MORBIDITY REPORTS.

Physicians.—Whenever any physician or other person knows that any person is sick with smallpox or other contagious or infectious disease, dangerous to the public health, he is required to at once give notice thereof to the justice of the peace of the precinct in which the disease occurs if outside of an incorporated city, town, or village; if within the limits of a city, town, or village, then the notice is to be given to the health officer of the county. Whenever such notice is given to any justice of the peace, it is his duty to at once notify the health officer of the county. (Acts of 1903, ch. 103, sec. 19.)

Householders.—Whenever any householder knows that any person in his family is sick with smallpox or other contagious disease, dangerous to the public health, he is required to immediately give the same notice thereof as is required of physicians. (Ibid., sec. 20.)

NEW YORK.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—Provision is made for a State department of health at the head of which is a commissioner of health, appointed by the governor. The commissioner must be a physician. (Consolidated Laws, 1909, p. 4422, sec. 2.)

In the State department of health there is a bureau of vital statistics for the registration of births, marriages, deaths, and prevalent diseases. (Ibid., p. 4423, sec. 5.)

If any municipal corporation (town, city, or village) authorized by law to establish a local board of health, omits to do so, the State commissioner may, in such municipality, exercise the powers of a local board of health and appoint a health officer for the corporation, and fix his duties and compensation. (Ibid., p. 4426, sec. 11.)

Towns (townships).—The town (township) board and one other citizen appointed by the town board constitute a town board of health, and appoint a physician to be town health officer. (Ibid., p. 4428, sec. 20.)

A town board of health does not have jurisdiction over any city or incorporated village, or part of such city or village within the town, provided such city or village has an organized board of health. (Ibid., p. 4445, sec. 34.)

Cities of the first class (cities having a population of over 175,000).—The charters of cities of the first class provide for the appointment of a commissioner of health by the mayor.

Cities of the second class (cities with a population of between 50,000 and 175,000).—In cities of the second class the commissioner of public safety (appointed by the mayor) exercises all the powers and performs the functions of a local board of health. He appoints a physician to be health officer. (Consolidated Laws, 1909, p. 5318, secs. 130, 131; and p. 5324, secs. 145, 146.)

Cities of the third class (cities with a population of less than 50,000).—In cities of this class there is a board of health consisting of the mayor and at least six other persons, one of whom must be a physician, nominated by the mayor, and appointed by the common council. This board, unless the city charter provides otherwise, appoints a physician to be health officer of the city. (Ibid., p. 4428, sec. 20.)

Villages.—In villages the board of trustees appoints a board of health of not less than three persons, nor more than seven. This board appoints a physician to be health officer. (Ibid.)

MORBIDITY REPORTS.

Notifiable diseases.—The following named diseases are those designated by the State department of health to be reported: Anterior poliomyelitis, anthrax, bubonic plague, cancer, cerebro-spinal meningitis, cholera, diphtheria, hydrophobia, leprosy, measles, ophthalmia neonatorum, pellagra, pneumonia, scarlet fever, smallpox, tetanus, pulmonary or laryngeal tuberculosis, typhoid fever, typhus fever, whooping cough, yellow fever. (Monthly Bulletin, New York State Department of Health, November, 1910, p. 299.) (*See also* p. 156.)

Physicians, etc.—Every physician is required to immediately give notice of every case of infectious and contagious or communicable disease, required by the State department of health to be reported to it, to the health officer of the city, town (township), or village in which the case occurs. When no physician is in attendance on the case, it is the duty of the superintendent or other officer of an institution, hospital, or hotel or lodging-house keeper, or other person where the case occurs, to give such notice. The physician or other person giving the notice is entitled to the sum of 25 cents therefor. (Consolidated Laws, 1909, p. 4436, sec. 25.) (*See also* p. 156.)

Tuberculosis is declared to be an infectious and communicable disease, dangerous to the public health, and it is made the duty of every physician to report in writing the name, age, sex, color, occupation, place where last employed if known, and address of every person known by such physician to have tuberculosis, this report to be made to the health officer of the city, town (township), or village in which the case occurs within 24 hours after the fact comes to the knowledge of the physician. (Ibid., p. 4544, sec. 320.)

It is also the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar public or private institution, to report in like manner the name, age, sex, color, occupation, place where last employed if known, and previous address of every person having tuberculosis who comes into his care, or under his observation, this report to be made within 24 hours. (Ibid., p. 4544, sec. 320.)

Upon the recovery of any person having tuberculosis it is the duty of the attending physician to make a report of the fact to the local health officer. (Ibid., sec. 330.)

Local health authorities.—Local boards of health are required to report to the State department of health promptly the facts relating to infectious, contagious, or communicable diseases, and every case of smallpox or varioloid within the municipality (city, village, or town). Health officers of cities, villages, and towns (townships) are to report in writing once a month to the State department of health all cases of such infectious and contagious or communicable disease as may be required by the State department of health. Health officers of villages and towns are to be paid by the municipalities employing them a sum not to exceed 20 cents for each case so reported. (Ibid., p. 4436, sec. 25.)

The health officers, commissioners of health, or boards of health of cities of the first class, are required to report promptly to the State department of health all cases of smallpox, typhus fever, yellow fever, and cholera. and the facts relating thereto. (Ibid., p. 4436, sec. 25.)

NORTH CAROLINA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of five persons (one of whom is a sanitary engineer) appointed by the governor, and four members of the Medical Society of the State of North Carolina chosen by the medical society by ballot. The board of health elects a secretary-treasurer who is known as the State health officer. (Revisal of 1905, secs. 4435, 4440.)

Counties.—There are county boards of health consisting of the chairman of the board of county commissioners, the mayor of the county town (in the absence of a mayor the clerk of the superior court), the county superintendent of schools, and two physicians chosen by the three first named. These boards elect in each county a county superintendent of health. The chairman of the board of county commissioners appoints as county quarantine officer a candidate approved by the State board of health. (Acts of 1911, ch. 62, secs. 9, 16.)

Townships.—The county quarantine officer is empowered to appoint one deputy quarantine officer in each township of the county. (Ibid., sec. 19.)

Cities.—City and town authorities are authorized to elect municipal health officers. (Ibid., sec. 14.) The city or town authorities may assign the duties of the quarantine officer in the city or town to the municipal health officer. (Ibid., sec. 15.)

MORBIDITY REPORTS.

Notifiable diseases.—Smallpox, diphtheria, scarlet fever, measles, whooping cough, yellow fever, typhus fever, cholera, and bubonic plague. (Ibid., secs. 17, 18.)

Physicians.—If a physician suspects that a person whom he is called to visit is infected with any one of the above-named diseases he is required to immediately give notice to the quarantine officer, or the deputy quarantine officer. (Ibid., sec. 18.)

Householders.—If a householder knows that a person within his family is sick with any one of the above-named diseases he is to give immediate notice to the quarantine or deputy quarantine officer. (Ibid., sec. 17.)

Deputy quarantine officers (townships).—The deputy quarantine officer is required to at once notify the county quarantine officer whenever he receives notice of the existence of cases of any of the notifiable diseases. (Ibid., sec. 19.)

Quarantine officers (counties and cities).—The quarantine officer is to notify the secretary of the State board of health by telegram within 24 hours after receiving information of the presence of yellow fever, cholera, typhus fever, or bubonic plague, of the existence of every case. He is also to mail to the secretary of the State board of health not later than the 5th of each month the original records of all cases of the notifiable diseases for the preceding month. (Ibid., sec. 19.)

NORTH DAKOKA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of a president, a vice president, and a superintendent of health appointed by the governor. The State board of health superintends the several city, village, and county boards of health. (Revised Code, 1905, secs. 252, 255.)

Counties.—Provision is made for county boards of health composed of a president, a vice president, and a county superintendent of health appointed by the board of county commissioners. The county boards of health have jurisdiction within their respective counties, outside of the corporate limits of cities having a city board of health, and subject to the supervisory control of the State board of health and the superintendent of public health. (Ibid., secs. 259, 262.)

Townships.—The supervisors of each township constitute a board of health for the township. (Ibid., sec. 3116.)

Cities.—In each incorporated city there is a board of health, and the mayor appoints a physician to be health officer. (Ibid., secs. 266, 267.)

The trustees of each incorporated village constitute a board of health for the village. (Ibid., sec. 3116.)

MORBIDITY REPORTS.

Physicians, etc.—Any physician attending a case of infectious or contagious disease is required by law to immediately notify the health officer within whose jurisdiction the case occurs, giving the name of the patient, place of residence, and character of the disease, and in addition to certify the facts to the clerk of the civil township in which the disease occurs, and in counties not organized into civil townships, to the county commissioner having jurisdiction. (Revised Code, 1905, sec. 290.)

The law also provides that whenever it comes to the knowledge of any physician or other person that a contagious, epidemic, or infectious disease exists within the jurisdiction of any local board, he shall immediately report to such board in writing the name and place of residence, if known, of every person afflicted with such disease, and if he is the attending physician of such person, he shall report not less than twice in each week the condition of each person so afflicted and the state of the disease. (Ibid., sec. 275.)

Each keeper of any private house, boarding house, lodging house, inn, or hotel is required to report in writing to the local board of health within whose jurisdiction the case may occur each case of contagious, infectious, or epidemic disease which may occur in his house, inn, or hotel, such report to be made within 24 hours after the existence of the disease becomes known, and to show the name of the patient and the nature of the disease. (Ibid., sec. 277.)

Also when no physician is employed, it is the duty of the parents to give, within 24 hours, notice to the proper office of the presence of contagious or infectious disease within their household. (Ibid., sec. 289.)

Also the oldest person next of kin, the keeper or other proper officer of every workhouse, poorhouse, reform school, jail, prison, hospital, asylum, or other public or charitable institution is to give like notice of any infectious or contagious disease occurring among the persons under his charge. (Ibid., sec. 289.)

Whenever one or both eyes of an infant become inflamed, swollen, or reddened, or show any unnatural discharge, or secretion at any time within two weeks after its birth, and no legally qualified physician is in attendance upon the infant at that time, it is the duty of its parents, or in their absence, whoever is caring for said infant, to report the fact in writing within six hours after discovery, to the health officer having jurisdiction. This report is not required to be made from recognized hospitals. (Acts of 1911, ch. 188, sec. 3.)

Local health authorities.—The health officer of each city, the clerk of each civil township, and in counties not organized into civil townships the county commissioner for his district, and the superintendent of the county board of health of each county are required to obtain and register in the registry of infectious and contagious diseases the names of the persons affected; the sex, color, and age of such persons; the nature of the disease; and the date of record. (Ibid., sec. 288.)

It is the duty of the health officer of each city and the clerk of each organized civil township, and in counties not organized into civil townships the county commissioner for his district, to make and send a certified copy of the registry of infectious and contagious diseases for the preceding month to the superintendent of the county board of health, not later than the 10th of each month. (Ibid., sec. 291.)

It is the duty of each local board of health, whenever it comes to its knowledge that a case of smallpox, scarlet fever, diphtheria, or other infectious or contagious disease exists within its jurisdiction, to immediately notify the State board of health of the existence and nature of such disease. (Ibid., sec. 282.)

County boards of health.—The superintendent of the county board of health of each county is to make and send to the State superintendent of health, on or before the 15th day of each month, a copy of the records showing all the cases of infectious or contagious diseases reported to him for the preceding month. (Ibid., sec. 292.)

The county superintendent of health is to report the facts immediately to the superintendent of public health (State) whenever any contagious or infectious disease occurs in his county, either among persons or animals. (Ibid., sec. 260.)

State authorities.—The superintendent of public health is to make to the governor on the 1st day of December of each even-numbered year a full report showing the character and extent during the preceding two years of all contagious or infectious diseases which have been reported to him. (Ibid., 1905, sec. 257.)

OHIO.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—Ohio has a State board of health consisting of eight members. The attorney general is ex officio member of the board. The other seven members are appointed by the governor. (Ohio General Code, 1910, sec. 1232.) The board elects a secretary. (Ibid., sec. 1234.)

Townships.—The trustees of the township constitute a board of health for the township outside the limits of cities and villages. They appoint a health officer. (Ibid., sec. 3391.)

Cities and villages.—The law specifies that the council of each city and village shall establish a board of health of five members appointed by the mayor. (Ibid., sec. 4404.) The board of health appoints a health officer. (Ibid., sec. 4408.)

In villages the council may appoint a health officer instead of a board of health, such appointee to be approved by the State board of health. (Ibid., sec. 4404.) If any city, village, or township fails or refuses to establish a board of health, or appoint a health officer, the State board of health may appoint a health officer for such city, village (ibid., sec. 4405), or township (ibid., sec. 3393).

MORBIDITY REPORTS.

Notifiable diseases.—Smallpox, cholera, plague, yellow fever, typhus fever, diphtheria, membranous croup, scarlet fever, typhoid fever, and any other disease dangerous to the public health, or required by the State board of health to be reported. (Ibid., sec. 4427.)

The State board of health requires reports also of cases of cerebrospinal meningitis, chickenpox, measles, whooping cough (Sept., 1910), infantile paralysis (Dec., 1910), and trachoma (Mar. 2, 1911).

Physicians.—Physicians or other persons attending cases of the above-named diseases, owners or agents of buildings in which cases reside, and heads of families in which cases exist are required to report the cases to the health officer within whose jurisdiction they occur, giving in such report the name, age, sex, and color of the patient and the house or place in which he may be found. (General Code, sec. 4427.)

Midwives, nurses, etc.—Midwives, nurses, or relatives in charge of infants less than 10 days old are to report within six hours in writing to the physician in attendance or to the local health officer whenever such infant's eyes become inflamed or swollen or show an unnatural discharge. (Ibid., sec. 12787.)

Boards of health.—Health authorities or officials, and physicians in localities where there are no health authorities or officials, are required to report promptly to the State board of health the existence of cases of Asiatic cholera, yellow fever, smallpox, scarlet fever, diphtheria, membranous croup, typhus or typhoid fever, and such other contagious or infectious diseases as the State board may specify. (Ibid., sec. 1243.)

The State board requires the boards of health of cities, villages, and townships to make semimonthly, on the 1st and 16th of each month, a report of the recorded cases of the following-named diseases: Asiatic cholera, bubonic plague, cerebro-spinal meningitis, chickenpox, diphtheria, measles, membranous croup, scarlet fever, smallpox, typhoid fever, typhus fever, whooping cough, and infantile paralysis. (Sept., 1910.)

OKLAHOMA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—Oklahoma has a State board of health in charge of one commissioner, known as the State commissioner of health, who is appointed by the governor and has power to make and enforce any and all needful rules and regulations for the prevention and cure and to prevent the spread of any contagious, infectious, or malarial disease among persons, and to superintend the several boards of health in the counties, cities, villages, towns, and townships. (Laws 1907–8, ch. 79, secs. 1, 2.)

Counties.—The law requires that the State commissioner of health shall appoint in every county of the State a county superintendent of public health, who shall be a practicing physician in good standing and a resident of the county. (Ibid., sec. 6.)

Townships.—In each township of each county the board of directors constitutes a township board of health, and in its capacity as such is under the supervision of the county superintendent of public health, and is governed by rules and regulations prescribed by the State board of health. It is the duty of the township board to enforce, under the direction of the county superintendent of public health, rules and regulations of the State board pertaining to quarantine or contagious and infectious disease. (Ibid., sec. 7.)

Cities.—Incorporated towns (villages): The town board of directors constitutes a board of health and performs the same duties as the township board, and is under the same supervision of the county superintendent and the State board. (Ibid., sec. 8.)

Cities of the first class: In cities of the first class the mayor and common council constitute a board of health and are authorized to appoint a city superintendent of public health, who shall be a practicing physician and a resident of the city. It is the duty of the mayor and council to enforce all rules and regulations in regard to the public health. (Ibid., sec. 9.)

(All cities of over 2,000 population may become cities of the first class.)

MORBIDITY REPORTS.

Physicians.—Practicing physicians are required to report to the county superintendent of public health, upon forms prescribed and furnished by the State board of health, all cases of infectious and contagious diseases, these reports to be made by the physician as soon as the disease is discovered. (Ibid., sec. 10; also Compiled Laws, 1909, sec. 349.)

In cities of the first class physicians report to the city superintendent of public health, upon forms prescribed and furnished by the State board of health, all cases of infectious and contagious diseases as soon as discovered. (Ibid., sec. 11; also Compiled Laws, 1909, sec. 350.)

Practicing physicians are required to report the cases of contagious and infectious diseases which have occurred in their practices during the month to the county superintendent or the city superintendent of public health, as the case may be, on the last day of each month. (Rules and regulations promulgated by the State commissioner of health pursuant to sec. 2, ch. 79, Session Laws 1907–8, rule 16.)

Tuberculosis is declared to be an infectious and communicable disease, dangerous to the public health, and it is made the duty of every physician to report in writing to the health officer of the city, town, or village, within 24 hours, the name, age, sex, color, occupation, place where last employed if known, and address of every person known by said physician to have tuberculosis. (Ibid, rule 41.)

It is also made the duty of the chief officer having charge for the time being of any hospital, dispensary, or asylum, or other similar public or private institution, to report in like manner the name, age, sex, color, occupation, place where last employed if known, and previous address of every patient having tuberculosis who comes into his care or under his observation, this report to be made within 24 hours. (Ibid., rule 41.)

Local health officers.—The city and county superintendents of health are required to make a report on the 10th day of each month to the State commissioner of health of all cases of contagious and infectious diseases reported to them for the preceding calendar month. (Ibid, rule 16.)

OREGON.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven members. The board elects a secretary, who becomes, by virtue of such election, a member of the board, and is known as the State health officer. (Oregon Acts, 1903, p. 82.)

Counties.—The county judge and county commissioners constitute ex officio a board of health for the county and elect a secretary, who becomes health officer.

Cities.—The mayor and common council of each incorporated city constitute a board of health for the city, except where boards of health are constituted by statute or city ordinance. Each board elects a secretary, who becomes health officer of the board. (Acts of 1905, ch. 170, as amended by ch. 82, Acts of 1907.)

MORBIDITY REPORTS.

Physician.—Every physician or other person having charge of a case of any infectious or epidemic disease must report the case immediately to the county or city health officer. (Acts of 1903, p. 82, sec. 12.)

It is the duty of every practicing physician to report to the county health officer, or to the health officer of the municipal corporation, within 24 hours, by the quickest means of communication, cases of diphtheria, membranous croup, scarlet fever, cholera, typhus fever, typhoid fever, smallpox, measles, cerebrospinal meningitis, ophthalmia neonatorum, infantile paralysis, bubonic plague, leprosy, barber's itch, and tuberculosis. (Rule 1, Oregon State Board of Health, 1911.)

It is the duty of the superintendent of any State institution or of any children's home, or other institution of a public nature, to report to the secretary of the State board of health any of the diseases enumerated in the preceding paragraph by the 10th day of each month for the preceding calendar month. (Rule 3, Oregon State Board of Health, 1911.)

It is also made the duty of every physician called to attend a person sick, or suspected of being sick, or in the absence of a physician, the householder, to report in writing within 24 hours, giving the name, and residence, all cases of cholera, yellow fever, smallpox, diphtheria, membranous croup, scarlet fever, typhus fever, typhoid fever, or "bubonic" (sic), or any other contagious disease, to the county health officer, or other health officer having jurisdiction. (Rule 17, Oregon State Board of Health, 1911.)

Local health authorities.—It is the duty of the county board of health to report to the secretary of the State board of health monthly, not later than the 10th day of the month, all cases of infectious disease which have been reported to the county board during the preceding month. Cities which keep their own records report direct to the State board of health in the same manner as the county boards. (Acts of 1903, p. 82, sec. 8.)

PENNSYLVANIA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a department of health, consisting of a commissioner of health and an advisory board. The commissioner is a physician, is the head of the department, and is appointed by the governor. (Laws of 1905, act 218, sec. 1.)

Districts.—In order to insure the management of the sanitary affairs and the registration of vital statistics in the different parts of the State, the commissioner of health is authorized to apportion the State into 10 districts and to appoint a physician in each district to be health officer and to have, under the direction of the commissioner, supervision and control of the sanitary affairs of the district and the registration of vital statistics. The commissioner of health may also appoint and employ such assistants to the health officers of the districts as he may deem necessary. (Laws of 1905, act 218, sec. 11.)

Pursuant to the above, a physician of five or more years' experience in the practice of medicine has been appointed in each county by the State department of health to act as a representative of the department. Townships in which there are no local boards of health have been grouped into about 700 districts, in each of which is a local health officer (not necessarily a physician) appointed and paid by the State department of health.

Townships of the first class (that is, townships with a population of at least 300 to the square mile).—It is the duty of the township commissioners to appoint a township board of health of five members, of whom one must be a physician. The board elects a health officer. (Laws of 1907, act 228, sec. 1.)

Cities.—Cities of the first class: In cities of the first class (cities with a population of over 1,000,000) there is a board of health of three members appointed by the mayor. One member is designated as the chief of the board of health, and is president of the board. The director of public health and charities is the chief executive officer of the board. (Purdon's Digest, p. 2925, secs. 786, 788; 1903 Public Laws, 157, sec. 4.)

Cities of the second class: In cities of the second class (cities with a population of between 100,000 and 1,000,000) there is a bureau of health, which is connected with and under the control of the department of public safety. The director of the department of public safety appoints a superintendent of the bureau of health, and such other employes as are necessary. (Purdon's Digest, p. 3024, sec. 107; 1895 Public Laws, 350, sec. 1.)

Cities of the third class: The council of any city of the third class (cities with less than 100,000 inhabitants) may by ordinance create a board of health, consisting of five members. (Laws of 1889, Art. XI, p. 306.)

Boroughs (incorporated villages with over 300 inhabitants).—It is the duty of the president of the town council or burgess, where he is the presiding officer, to appoint a board of health of five members. (Purdon's Digest, Vol. I, p. 532; 1893 Public Laws, 44.)

MORBIDITY REPORTS.

Physicians.—Every physician practicing in any portion of the State who treats or examines any person suffering from or afflicted with actinomycosis, anthrax, bubonic plague, cerebro-spinal meningitis (epidemic), cerebro-spinal fever (spotted fever), chickenpox, Asiatic cholera, diphtheria (diphtheritic croup, membranous croup, putrid sore throat), epidemic dysentery, erysipelas, German measles, glanders (farcy), rabies (hydrophobia), leprosy, malarial fever, measles, mumps, pneumonia (true), puerperal fever, relapsing fever, scarlet fever (scarlatina, scarlet rash), smallpox (variola, varioloid) tetanus, trachoma, trichiniasis, tuberculosis in any form, typhoid fever, typhus fever, whooping cough, uncinaria duodenalis (hook worm),[1] pellagra,[1] anterior poliomyelitis (infantile paralysis),[1] or yellow fever is required, if said case is located in a township of the first class, a borough, or a city, to forthwith make a report in writing to the health authorities of said township, city, or borough; and, if the case is located in a township of the second class, or a city, borough, or township of the first class not having a board of health or body acting as such, to the State department of health, upon blanks supplied for that purpose, in which report he shall, over his own signature, state the name of the disease, and the name, age, sex, color, nativity, and occupation, if any, of the person suffering therefrom, together with the street and house number of the premises in which said person may be located, or otherwise sufficiently designate the same, the date of the onset of the disease, the name and occupation of the householder in whose family the disease may have occurred, the number of children in said household attending school, and the name or names of the school or schools so attended, together with such other information relating to said case as may be required by said health authorities and the State department of health. (Laws, 1909, act 658, sec. 1.)

Local health authorities.—The health authorities of the several cities, boroughs, and townships of the first class are required at the end of each week, and for the fraction of each week occurring at the end of the month, to report to the State department of health, upon blanks supplied for that purpose, a list of all cases of communicable diseases mentioned in the preceding paragraph, which have been reported to them during said period; which report is to contain the name of each person suffering therefrom, respectively, and his or her age, sex, color, and nativity, together with the name of the disease and the date of the onset thereof; and in the event of no reports of any of said diseases having been received by the aforesaid health authorities, respectively, during any said period, that fact is required to be reported to the State department of health. All superintendents and other persons in charge of asylums, hospitals, or other institutions located in townships of the second class are required, at the end of each week, and portion of a week occurring at the end of each month, to report to the State department of health, on blanks supplied for that purpose, a list of the inmates of such institutions, respectively, who may have suffered from any of the diseases enumerated in the preceding paragraph, together with the above-mentioned data relative to each inmate, with the date of his or her admission to the institution, and the name of the city, borough, or township from which he or she was admitted. (Laws, 1909, act 658, sec. 23.)

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[1] Added to list of reportable diseases by regulation adopted by the advisory board of the State department of health July 7, 1910, pursuant to act 218, approved Apr. 27, 1905.

Midwives and nurses.—Whenever one or both eyes of an infant become inflamed or swollen or reddened at any time within two weeks after birth, it is the duty of the midwife or nurse, or other person having care of the infant, to report the facts to the health officer or a legally qualified practitioner, in writing, within six hours after the discovery of the condition. (Public Laws, 1895, p. 373, sec. 1, Purdon's Digest, 13th ed., p. 1886, sec. 78.)

PORTO RICO.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

Island.—The governor appoints a member of the executive council to be director of health, charities, and corrections. (Laws of 1904, p. 89.) The director of health, charities, and corrections appoints an insular board of health and a director of sanitation. The director of sanitation is the chief sanitary officer of the island and the executive officer of the board of health. The chairman of the insular board of health is the chief of the bureau of vital statistics. (Laws of 1911, act 68, secs. 1–3.)

Sanitary districts.—For sanitary purposes the island is divided into four sanitary districts. Each district is in charge of a sanitary inspector appointed by the director of sanitation. (Ibid., sec. 17.)

Sanitary zones.—Each sanitary district is divided into sanitary zones. Each zone is in charge of a health officer under the immediate orders of, and appointed by, the director of sanitation. Each sanitary zone has a board of health of three members. (Ibid., secs. 22–23.)

Towns.—A sanitary police agent is appointed in each town having less than 10,000 inhabitants and at least two in towns having over 10,000 inhabitants. (Ibid.)

MORBIDITY REPORTS.

Notifiable diseases.—Exanthematic typhus, typhoid fever, smallpox, varioloid, scarlet fever, diphtheria, yellow fever, asiatic cholera, bubonic plague, beriberi, epidemic dysentery, cerebro-spinal meningitis, whooping cough, epidemic parotiditis, malaria, tuberculosis, glanders, leprosy, cutaneous syphilis, and hookworm disease, or uncinariasis. (Laws of 1911, act 68, sec. 25.)

Physicians.—Physicians are required to report cases of the above-named diseases to the nearest health officer, and all cases of infectious or contagious diseases treated by them to the local health officer. (Ibid., secs. 25–26.)

Local health officers.—Health officers are required to immediately report to the director of sanitation all cases of infectious or contagious diseases reported to them by physicians. (Ibid., sec. 26.)

RHODE ISLAND.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven members. The board elects a physician to be secretary, who becomes ex officio a member of the board, the commissioner of public health, and State registrar. (General Laws of Rhode Island, 1909, ch. 115, p. 415.)

Towns (townships).—The town councils and boards of aldermen constitute ex officio boards of health in their respective towns. (Ibid., ch. 50, p. 232.)

The town council is required to appoint a health officer. (Ibid., ch. 107, sec. 5.) The cities of Providence and Newport and such other towns as may establish a board of health or elect a superintendent of health are exempt from these provisions. (Ibid., sec. 7.)

Cities.—The city council of any city may appoint a board of health for the city, which may have any or all the powers and duties of the board of aldermen as a board of health as the city council may determine. (Ibid., ch. 50, p. 232.)

MORBIDITY REPORTS.

Physician, householder, etc.—Every householder is required to immediately inform the town council of the town wherein he dwells of any person in the house or tenement occupied by him who has smallpox or any other contagious or infections distemper, or is suspected of being so affected. Every physician, householder, or other person having knowledge of the existence of smallpox in any town is required to immediately notify the town clerk, or, in cities, the superintendent of health. (General Laws, Rhode Island, 1909, ch. 110, secs. 13, 19.)

Any physician who discovers a case of poliomyelitis, tuberculous meningitis, or cerebrospinal meningitis is required to immediately report the existence of each and every case to the secretary of the State board of health. (Laws 1911, ch. 728, sec. 1.)

Physicians are to report to the secretary of the State board of health within seven days, upon blanks provided by the State board for the purpose, the name, sex, age, color, occupation, social condition, and residence of persons under their care affected with pulmonary or laryngeal tuberculosis. (Acts of 1909, ch. 386, sec. 12.)

Institutions.—The superintendent or other person in charge or control of any hospital, school, reformatory, or other institution deriving the whole or any part of its support from the public funds of the State, having in charge or under his care and custody any person suffering with pulmonary or laryngeal tuberculosis, is to make or cause to be made, within 48 hours, a record of name, age, sex, color, occupation, social condition, and residence of the person affected, this information to be forwarded each week to the secretary of the State board of health. (Ibid., sec. 11.)

Midwives, nurses, etc.—Midwives or nurses in charge of infants under 2 weeks of age are to report to the health officer within 6 hours in writing or to a physician, whenever the eyes of such infant become inflamed. (General Laws, 1909, ch. 343, sec. 25.)

State.—It is the duty of the State board of health to keep a register of all persons known to be affected with laryngeal or pulmonary tuberculosis. (Acts of 1909, ch. 386, sec. 10.)

SOUTH CAROLINA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of the South Carolina Medical Association, together with the attorney and comptroller general of the State. The above-named medical association every seven years elects seven members to be recommended to the governor for appointment to cooperate with the State officers named to constitute an executive committee, having power to act in the intervals between sessions of the State board of health. Upon the recommendation of the executive committee the governor appoints a State health officer, who becomes secretary and executive officer of the State board of health. The executive committee is authorized to divide the State into health districts, and in districts in which there are no boards of health it is required to appoint subboards of health.

The State board of health is invested with authority to direct and supervise the action of local boards of health in cities, towns, and townships, and may remove members of the local boards of health for cause. (South Carolina Code, 1902, Title VIII, Ch. XXIII, and Act No. 433, 1908.)

Cities, towns, and villages.—It is the duty of the mayor or intendant of every incorporated city, town, or village to appoint a board of health, which shall elect a secretary and a health officer. (South Carolina Code, 1902, Title VIII, Ch. XXIII.)

The executive committee of the State board has power and it is its duty to appoint local boards of health in all unincorporated towns and villages of more than 100 population. (Act No. 82, 1906.)

MORBIDITY REPORTS.

Notifiable diseases.—The State board of health is authorized to name the diseases it considers contagious and infectious. (Act No. 395, 1910, sec. 4.) The executive committee of the board has named the following: Tuberculosis, typhoid fever, diphtheria, scarlet fever, smallpox, measles, whooping cough, epidemic cerebrospinal meningitis, leprosy, and poliomyelitis.

Physicians.—It is the duty of physicians in incorporated cities and towns to report to the secretary of the local board of health within 24 hours cases of contagious or infectious disease occurring within their practice. Physicians outside of incorporated cities and towns report within 24 hours direct to the secretary of the State board of health upon blanks furnished by the State board. (Act No. 395, 1910, secs. 1, 3.)

Midwives and nurses.—In cities having over 1,000 inhabitants midwives and nurses are to report at once to the local board of health whenever an infant under their charge has reddened or inflamed eyes. (Criminal Code, 1902, sec. 331.)

Local boards of health.—It is the duty of secretaries of local boards of health to report to the secretary of the State board of health, not later than the 5th day of each month, all cases of contagious and infectious disease reported to them during the preceding month, the report to be made upon blanks furnished by the State board. (Act No. 395, 1910, sec. 2.)

SOUTH DAKOTA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The State board of health consists of five physicians appointed by the governor. The board annually elects a superintendent, who is ex officio secretary of the board. (Political Code, 1903, secs. 238, 240, as amended by ch. 217, Laws of 1903.)

Counties.—Provision is made for a county board of health in each county, consisting of the State's attorney of the county, and two physicians appointed by the State board of health, one of whom shall be superintendent of the county board and ex officio its secretary; the other shall be vice president of the board. (Ibid., sec. 246.)

Cities.—City councils have the power to appoint a board of health for their respective cities and to prescribe its powers and duties. (Ibid., sec. 1229.)

MORBIDITY REPORTS.

Physicians.—Whenever any physician shall know or suspect that any person whom he is called to visit has smallpox, scarlet fever, diphtheria, measles, cholera, or any other disease dangerous to the public health, such physician shall give notice immediately, including the location and a full description of the case, to the superintendent of the county board of health within whose jurisdiction the case occurs. (Regulations State board of health, rule 5.)

All cases of poliomyelitis, or suspected cases are to be reported immediately by the attending physician, or head of the family, to the county board of health. (Regulations State board of health, Sept. 28, 1910.)

Householders.—Whenever any householder shall know or suspect that any person in his family or temporarily residing with him is sick with smallpox, scarlet fever, diphtheria, cholera, or any other disease dangerous to the pubilc health he shall immediately give notice to the health officer having jurisdiction. (Ibid., rule 4.)

Municipal health officers.—City and town health officers are required to record the returns of all contagious and infectious diseases and to forward the returns monthly to the county superintendent of health. (Ibid., rule 15.)

County superintendents.—Superintendents of county boards of health are required to report immediately to the superintendent of the State board of health whenever any contagious or infectious disease occurs in their respective counties. (Political Code, 1903, sec. 248.)

TENNESSEE.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of three physicians, one live-stock breeder, and ex officio the State commissioner of agriculture. (Acts of 1897, ch. 46, sec. 1.)

Counties.—The county judge, court clerk, and health officer or jail physician constitute the county board of health, the last named being president of the board. (Law passed Apr. 4, 1885, sec. 1.)

It is the duty of county courts in counties having jails to appoint a jail physician or health officer. (Ibid., sec. 4.)

Cities.—Every municipality having 5,000 or more inhabitants is required to organize a board of health. (Laws of 1877.) Boards of health of cities and towns have jurisdiction and authority in the territory extending 1 mile from the corporation limits, provided such jurisdiction shall not extend beyond the limits of the county in which the municipality is situated, and provided that where two cities lie less than 2 miles apart the distance be divided between them. (Laws of 1877, ch. 28, sec. 7.)

MORBIDITY REPORTS.

Notifiable diseases.—Smallpox, yellow fever, cholera, bubonic plague, typhus fever, diphtheria, membranous croup, scarlet fever, or other communicable disease (except venereal diseases). (Acts of 1905, ch. 519, sec. 1.) The State board of health by resolution added poliomyelitis to the preceding list October 4, 1910.

The cards issued for the monthly report of contagious diseases contain, in addition to the above-named diseases, the following: Pulmonary tuberculosis, typhoid fever, cerebrospinal meningitis, measles, chicken pox, whooping cough, and pellagra.

Householders.—Whenever any one of the above-named diseases exists, or is suspected to exist in any household, it is the duty of the head of the household or any other person in the household having knowledge of the facts to immediately notify the municipal or county health authorities. (Ibid.)

Physicians.—It is also the duty of physicians to immediately report cases of the above-named diseases to the municipal or county health authorities. (Ibid., sec. 2.)

Nurses, midwives, etc.—Nurses, midwives, or other persons having care of infants under 2 weeks of age are to report immediately to the health officer or a legally qualified practitioner of medicine whenever one or both eyes of an infant become inflamed or reddened. (Acts of 1911, ch. 10, sec. 1.)

Local health authorities.—It is the duty of municipal and county boards of health upon receiving information of the existence or suspected existence of any case of smallpox, cholera, yellow fever, scarlet fever, diphtheria, or other disease dangerous to the public health to immediately notify the State board of health of the fact, and on the first of each month make a written report to the State board of health of all cases of communicable disease occurring in their respective jurisdictions during the preceding calendar month. (Acts of 1905, ch. 519, sec. 11.)

TEXAS.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health consisting of seven members appointed by the governor. Each member must be a legally qualified practicing physician, who has been in the actual practice of medicine in the State of Texas for at least 10 years. One member is designated by the governor as State health officer and is the president and executive officer of the board. (Laws of 1909, ch. 30, sec. 1.)

The president of the board appoints a registrar of vital statistics who is also the secretary of the board. (Ibid., sec. 4.)

The county and city health officers are under the general direction of the State board of health to which they are required to make such reports as the State board may require. (Ibid., secs. 25, 26, 28.)

Counties.—It is the duty of the commissioner's court of each organized county to appoint a competent physician to be county health officer. (Ibid., secs. 17, 18, 19.)

Cities.—It it the duty of the city council or the city commissioners, as the case may be, of each incorporated city and town within the State to elect a competent physician to the office of city health officer, except in cities where a different method of selecting city health physicians is provided for by charter, in which event the office of city health officer is to be filled as is provided for that of city physician. (Ibid., secs. 21, 22.)

MORBIDITY REPORTS.

Notifiable diseases.—The following-named diseases are classed as contagious: Asiatic cholera, bubonic plague, typhus fever, yellow fever, smallpox, scarlet fever, diphtheria, epidemic cerebrospinal meningitis, dengue, typhoid fever, epidemic dysentery, trachoma, tuberculosis, anthrax. (Acts of 1909, ch. 30, sec. 10, rule 3, as amended by acts of 1911, ch. 95, sec. 1.)

Physicians, etc.—Physicians are to report in writing or by telephone to the local health authority (city or county health officer, or local board of health) immediately each patient known to have or suspected of having a contagious disease. If the disease is pestilential in character the physician is to notify the president of the State board of health by telegraph or telephone at State expense. (Ibid., rule 1.)

Every hotel proprietor, keeper of a boarding house, or inn, or householder, or head of a family in a house wherein any case of reportable contagious disease occurs, is required to report such case to the local health authority within 12 hours unless previous notice has been given by the physician in attendance. (Ibid., rule 23.)

Midwives, nurses, etc.—Persons not practitioners of medicine are to report cases of inflammation of the eyes of infants under their care to the local health authority or to a reputable physician within 12 hours. (Ibid., 10, rule 22.)

Local health authorities.—City and county health authorities are required to keep a record of all cases of contagious disease reported to them including the name, age, sex, race, and location of the persons affected. They are also required to report these cases by the fifth of each month for the preceding calendar month to the president of the State board of health on blanks furnished by the State board. The reports on tuberculosis are to be considered confidential. (Ibid., rule 4.)

UTAH.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of seven members appointed by the governor. A majority of the members must be physicians and one a civil engineer. (Compiled Laws 1907, sec. 1096.)

Counties.—Each board of county commissioners is required to divide the county, outside of incorporated municipalities, into sanitary districts and to appoint a health officer for each district. The district health officers, together with the board of county commissioners, constitute the county board of health. (Ibid., sec. 1106.)

Cities.—It is the duty of the board of trustees or the city council of every incorporated town and city to establish by ordinance a board of health of three or more members, one of whom shall, when practicable, be a physician and the executive officer of the board and be known as the health officer. (Ibid., sec. 1105.)

MORBIDITY REPORTS.

Physicians, etc.—It is the duty of every physician or other person caring for the sick to report immediately to the local board of health cases of scarlet fever, diphtheria, whooping cough, smallpox, typhoid fever, measles, tuberculosis, cholera, rubella, chickenpox, typhus fever, plague, cerebrospinal meningitis, poliomyelitis, leprosy, or pneumonia coming under his charge. (Ibid., sec. 1113x11, as amended by laws of 1911, ch. 75, sec. 1.)

Every physician and every superintendent of a hospital or public institution is required to immediately report to the State board of health every case of tuberculosis which he is called upon to treat or which is in such hospital or public institution. (Ibid., sec. 1113x27.)

All physicians or other persons having knowledge of the existence of any contagious or infectious disease, or having reason to believe that any such disease exists, are required to report the fact immediately to the local board of health. (Ibid., sec. 1111.)

It is the duty of every physician and every superintendent or manager of a hospital or public institution to immediately report to the local board of health every case of venereal disease which he is called upon to treat, or which may be in such hospital or institution, and to make such reports as may be called for by the regulations of the State board of health. The name of the person affected is not to be included in the report. (Laws of 1911, ch. 90, sec. 1.)

It is the duty of physicians and midwives to report to the local board of health within six hours every case where a newly born child has inflammation of the eyes attended by a discharge. (Laws 1911, ch. 61, sec. 1.)

Local health authorities.—Local boards of health or health officers report to the secretary of the State board of health monthly on or before the 5th day of each month all cases of scarlet fever, smallpox, diphtheria, membranous croup, typhoid fever, whooping cough, measles, chickenpox, pneumonia, and tuberculosis which have occurred in their respective jurisdictions during the preceding month. (Compiled Laws, 1907, sec. 1108.)

Upon receipt of a notification of inflammation of the eyes of a newly born child, the local health officer is to report immediately by telephone or telegraph to the State board of health. (Regulations, State board of health, 1911.)

VERMONT.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of three members appointed by the governor. The board appoints a physician as secretary and may also appoint a sanitary engineer and inspector. (Public Statutes, 1906, secs. 5409 and 5411.)

Towns (*townships*).—The State board appoints a health officer for each town. The health officer, together with the selectmen of the town, or the board of aldermen of the city constitutes a local board of health for such town or city. (Ibid., secs. 5433 and 5434.)

MORBIDITY REPORTS.

Physicians, etc.—Physicians are required to report immediately to the local health officer cases of communicable disease dangerous to the public health giving the location of the cases, the name of the patient, and the degree of virulence, cause, and source of the disease. The head of a family in whose home there occurs a case of infectious or contagious disease dangerous to the public health is required to immediately notify the local health officers. (Public Statutes, 1906, sec. 5454.)

Physicians are required to report cases of tuberculosis to the secretary of the State board of health, giving the name and address of the person affected. (Ibid., sec. 5450.)

Nurses, etc.—It is made the duty of the nurse, relative, or other person having charge of an infant to report in writing within six hours thereafter to the local health officer of the town or city in which the parents of the infant reside, whenever one or both eyes of an infant become inflamed, swollen, or reddened, and have an unnatural discharge at any time within two weeks after its birth. (Regulation, State board of health.)

Local health authorities.—Upon receiving notice of a case of contagious or infectious disease dangerous to the public health, local health officers are to immediately report the facts of the case to the secretary of the State board of health. When a communicable disease prevails or becomes epidemic, the local health officer is to make weekly reports concerning the disease to the State board. (Ibid., sec. 5455.) Local health officers are to report to the secretary of the State board of health immediately every case of smallpox, varioloid, Asiatic cholera, typhus fever or yellow fever occurring within their respective jurisdictions. (Ibid., sec. 5453.)

VIRGINIA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health consisting of 12 members appointed by the governor, one from each congressional district and two additional from the city of Richmond. The governor also appoints a health commissioner who is the executive officer of the State board of health, although not a member of the board. (Pollard's Code, Biennial, 1908, sec. 1713d.)

Counties, towns, and cities.—The State board of health appoints annually three physicians of each county or corporation, who, with the chairman of the supervisors or the mayor of the corporation, as the case may be, constitute a county, town, or city board of health. This does not apply to cities or towns whose charters provide for the creation of a board of health. Each board elects one of its medical members to be secretary and health officer.

MORBIDITY REPORTS.

Notifiable diseases.—The State board of health is authorized to prepare and promulgate from time to time a list of diseases considered as infectious, contagious, communicable, or dangerous, and of which cases are to be reported, and to prescribe the manner and time of the report. (Ibid., sec. 2.)

In compliance therewith the State board, in rule 30 (effective Nov. 1, 1910), requires every physician to report immediately to the secretary of the local board of health having jurisdiction, every case of the following-named diseases occurring in his practice: Smallpox, Asiatic cholera, bubonic plague, diphtheria, scarlet fever, and yellow fever. These diseases are termed reportable diseases, Class I. Rule 31 (effective Nov. 1, 1910) requires every physician to report to the secretary of the local board of health having jurisdiction, once each month, cases of the following-named diseases occurring in his practice: Typhoid fever, measles, chickenpox, tuberculosis, and hookworm disease. These are termed reportable diseases, Class II.[1]

Physicians.—Every practicing physician who knows or suspects that any person whom he is called upon to visit, or who comes to him for examination or treatment, is suffering from any infectious, contagious, communicable, or dangerous disease is to report in writing, on blanks to be furnished for that purpose by the State board of health, to the executive officer of the board of health of the county, town, or city in which such person may be located, over his or her own signature, stating the name of the disease, and name, color, sex, and age of the person suffering therefrom, together with the street and number or such other sufficient designation of the house, room, or other place in which said person may be located, and giving such other information as may be deemed necessary by said health authorities. (Acts of 1910, ch. 307, sec. 1.)

Local health authorities.—It is the duty of the local authorities of the cities, towns, and counties of the State to report weekly to the State board of health all cases of infectious, contagious, communicable, or dangerous diseases which have occurred within their respective jurisdictions, except that it shall be their duty to report immediately any case or cases of smallpox, yellow fever, cholera, typhus fever, or bubonic plague that may occur. (Acts of 1910, ch. 340, sec. 7.)

WASHINGTON.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—There is a State board of health of five members appointed by the governor. (Ballinger's Code, ch. 10, sec. 2956.) These five so appointed elect a physician, who may or may not be a member of the board, to be State commissioner of health. The State commissioner of health is ex officio secretary and executive officer of the State board of health. (Acts of 1909, ch. 208, secs. 1, 2.)

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[1] Poliomyelitis was made notifiable during the early part of 1911. (Letter, State Commissioner of Health, Oct. 31, 1911.)

The State board of health may remove from office any health officer who refuses or neglects to make prompt and accurate reports to the county health officer or to the State board of health, and any officer thus removed may not again be reappointed, except with the consent of the State board. (Acts of 1907, ch. 85, sec. 5.)

Counties.—The board of county commissioners in each county constitutes a county board of health having jurisdiction throughout the county, excepting in cities of the first class (cities having a population of over 20,000). This board appoints a physician as health officer, who becomes ex officio a member of the board and its executive officer. (Ibid, sec. 1.)

Cities.—The mayor of each incorporated city and town is required to appoint a physician as health officer of the city or town. This, however, does not apply to cities of the first class (cities with over 20,000 inhabitants). Nor does it apply to cities of the second class (cities with between 10,000 and 20,000 inhabitants) having a board of health, in which the health officer is appointed by the board of health. (Ibid, sec. 2.)

In cities of the first class, except in those having a board of health organized and a health officer appointed under the provisions of a special charter, the council organizes as a board of health, or appoints wholly or partially from its own members a suitable number of persons to act as such a board. This board appoints a health officer, who is ex officio a member of the board and its executive officer. (Ballinger's Code, 1897, sec. 1237.)

MORBIDITY REPORTS.

Notifiable diseases.—The State board of health is authorized to designate the diseases which shall be construed as dangerous, contagious, or infectious. (Remington and Ballinger's Annotated Codes and Statutes, 1910, sec. 5547.)

The State board of health has declared the following-named diseases to be contagious or infectious, and dangerous to the public health, and, as such, to be reported by physicians: Anterior poliomyelitis, Asiatic cholera, beriberi, chickenpox, diphtheria (or membranous croup), epidemic cerebro-spinal meningitis, favus, leprosy, measles, plague, pellagra, scarlet fever (scarlatina or scarlet rash), smallpox, pulmonary and abdominal tuberculosis, trachoma, typhoid fever, typhus fever, uncinariasis (or hookworm disease), whooping cough, yellow fever, and so-called cedar, Cuban, dobe, Egyptian, Japanese, kangaroo, Manila, or Philippine itch. (Rules and regulations State board of health, 1910, p. 6.)

(Note.—So-called cedar, Cuban, dobe, Egyptian, Japanese, kangaroo, or Manila itch are different names at times erroneously used for mild forms of smallpox.)

Smallpox is to be immediately reported by the attending physician, or in his absence by the head of the family or householder, to the local health officer. (Rules and regulations State board of health, 1910, p. 4.)

Physicians.—Physicians are required to report within 24 hours to the local health officer having jurisdiction (in cities to the city health officer; outside of cities, to the county health officer) cases of dangerous, contagious, or infectious diseases, or diseases required by the

State board of health to be reported. (Remington and Ballinger's Code, 1910, sec. 5545.)

Every physician is also to report immediately to the local health officer every case of obscure eruptive disease of the nature of which he is in doubt. (Rules and regulations State board of health, 1910, p. 6.)

Householders.—Whenever any householder knows that any person within his household is affected with an acute disease, accompanied with eruption of the skin, said householder shall immediately notify either the proper health officer or the family physician. (Rules and regulations State board of health, 1910, p. 6.)

City health officers.—All city health officers (except those of cities of the first class) are to report immediately in duplicate to the county health officer and to the State commissioner of health every new outbreak (that is, first case or cases) of any contagious or infectious disease within their respective jurisdictions, and thereafter are to report weekly all contagious and infectious diseases to the county health officer only. If no contagious or infectious disease is present within their jurisdictions, report of the fact is to be made to the county health officer not less than once each month. (Rules and regulations State board of health, 1910, p. 4.)

Health officers of cities of the first class (having a population of over 20,000) make the same reports, and are governed by the same rules as the county health officers, unless otherwise specified, and communicate directly with the State commissioner of health. (Rules and regulations, State board of health, 1910, p. 4.)

County health officers.—County health officers are to make monthly reports of all contagious or infectious diseases to the State commissioner of health, by the 5th day of the month for the preceding calendar month. Local health officers send the original reports received or filled out by them to the county health officer, who makes and keeps a record of each case, and who, in addition to his monthly report, forwards therewith to the State commissioner of health the original reports of individual cases of typhoid fever, tuberculosis, epidemic cerebro-spinal meningitis, anterior poliomyelitis, hookworm disease, and pellagra. If no infectious or contagious diseases occur during the month, such fact must be reported.

The county health officer makes his monthly report on blanks furnished by the State commissioner of health, and is to indicate thereon the geographic distribution of cases within his jurisdiction, the cities where no contagious or infectious diseases have occurred during the month, and cities which have neglected to make reports.

Immediately upon learning of the first case of Asiatic cholera, chicken pox in adults, diphtheria, plague, scarlet fever or scarlet rash, smallpox, yellow fever, or typhus fever, within their respective jurisdictions, county health officers must notify the State commissioner of health, and after investigation, send a report stating fully the source of infection and probable number of persons exposed from this or previously unknown cases, the danger of the disease spreading, and what measures have been taken for its control; and thereafter they are to make reports of the course of the disease, as long as cases remain, at such intervals as directed by the commissioner of health. (Rules and regulations, State board of health, 1910, p. 4.)

WEST VIRGINIA.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health consisting of two physicians from each of the five congressional districts of the State. (Code of 1906, ch. 150.)

Counties.—It is made the duty of the county court to nominate and the State board of health to appoint three persons in each county who, together with the president of the county court and the prosecuting attorney for the county, shall constitute the county board of health. One member of this board is to be a physician, who becomes the executive officer of the board and the county health officer. The county board is to enforce within the county, outside of municipalities, the rules and regulations of the State board of health. (Code of 1906, ch. 150.)

Cities.—It is made the duty of the council of every incorporated city, town, or village to nominate, and the State board of health to appoint, in each incorporated city, town, or village three persons, one of whom shall be a physician, who, together with the mayor and city solicitor, if there be a city solicitor, constitute a board of health for the municipality, the physician on the board to be health officer. The boards of health of incorporated cities, towns, and villages are independent of the county board, and are auxiliary to the State board of health.

MORBIDITY REPORTS.

Physicians.—It is the duty of physicians, where there is a local board of health, to report promptly cases of disease of the following character: Cholera, smallpox, scarlet fever, diphtheria, tuberculosis, and other endemic, epidemic, infectious, and contagious diseases. (Code of 1906, sec. 4383.)

City and county boards of health.—City and county boards of health are required to report at least once in every three months to the State board of health the character of all such infectious, contagious, and epidemic diseases (enumerated above), and the number of persons reported as infected, giving their names. (Ibid.)

WISCONSIN.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health and vital statistics of seven members. (Wisconsin Statutes, 1898, sec. 1404.) They elect a secretary, who may be a member of the board. If a person is elected who is not a member of the board, he becomes a member upon election as secretary. (Acts of 1905, ch. 433, sec. 1.)

Towns (townships).—The town board of every town is required to organize as a board of health, and appoint a health officer, who is ex officio a member of the board and its executive officer. (Acts of 1907, ch. 140, sec. 1411.)

Cities.—The village board or common council of every village and city is required to organize as a board of health, and to appoint a health officer, who is ex officio a member of the board and its executive officer. (Ibid.)

Dangerous and contagious diseases.—The State board of health has declared the following-named diseases to be "dangerous and contagious": Asiatic cholera (cholerine), yellow fever, smallpox, typhus fever, leprosy, bubonic plague, diphtheria, scarlet fever (scarlatina), typhoid fever, measles (including rotheln), whooping cough, cerebrospinal meningitis. (Rules Wisconsin State board of health, adopted Aug. 7, 1907), and anterior poliomyelitis. (Rules Wisconsin State Board of Health, adopted Jan. 28, 1910.)

Physicians, etc.—Whenever a physician knows or has good reason to believe that any person whom he is attending is sick with a "dangerous, contagious, or infectious" disease, he is required by law to immediately report the case in writing to the local board of health, giving the nature of the disease and the name, age, sex, and place of residence of the person sick. In the absence of an attending physician the report is to be made by the head of the family or the person in charge of the house or building. (Acts of 1909, ch. 85, sec. 1.)

Physicians are required to report to the local board of health the name, age, and address of persons having any of the above-mentioned diseases or tuberculosis, chicken pox, or erysipelas. It is the duty of every physician or person, or owner, agent, manager, principal, or superintendent of every public or private institution or dispensary, hotel, boarding or lodging house, to report to the local (town, city, or village) department of health in writing or to have such a report made by some competent person, giving the name, age, sex, occupation, and latest address of every person afflicted with tuberculosis, who is in his care, or who has come under his observation, within one week. (Acts of 1905, ch. 192.)

Nurses, etc.—When one or both eyes of an infant become inflamed, swollen, and red, and show an unnatural discharge at any time within two weeks after its birth, the nurse, parents, or other attendant having charge of the infant are required to report the case in writing within six hours to the local board of health. (Acts of 1909, ch. 59, sec. 1.)

Local health authorities.—It is the duty of every local health officer, upon the appearance of any dangerous or contagious disease within his jurisdiction, to immediately investigate all the circumstances attendant upon the appearance of the disease and make a full report to the State board of health. (Wisconsin Statutes, 1898, sec. 1412.)

WYOMING.

HEALTH ORGANIZATION FOR THE COLLECTION OF MORBIDITY REPORTS.

State.—The law provides for a State board of health of three members appointed by the governor, one member of the board to be a physician, and to constitute the secretary and executive officer of the board. (Acts of 1901, ch. 55, secs. 1, 2.)

Counties.—The State board of health appoints a practicing physician in each county to be county health officer. (Ibid., sec. 3.)

The county health officers are under the direction and supervision of the State board of health, and the State board has authority to make such rules and regulations for the government and direction of county health officers as in its judgment may be best suited to maintain the public health. (Ibid., sec. 18.)

The State board or the county health officer may appoint an assistant county health officer in any locality remote from the residence of the county health officer, whenever the State board of health or the county health officer deem it expedient. (Rules and regulations, State board of health, 1909.)

MORBIDITY REPORTS.

Householders.—Whenever any householder knows or has reason to believe that any person within his family or household has any communicable disease, he is required to immediately give notice thereof to the county health officer or assistant health officer of the county within which he resides, such notice to be given at the office of the health officer within the shortest possible time, and by the most direct means of communication. (Rules and regulations, State board of health, 1909.)

Physicians.—Every practicing and licensed physician is required to make an immediate report of every case of communicable disease occurring in his practice to the county health officer. (Rules and regulations, State board of health, promulgated pursuant to sec. 3, ch. 99, Laws of 1909.)

It is the duty of every practicing or licensed physician to report immediately to the secretary of the State board of health and county health officer by telegram or telephone or in the most expeditious manner, every case of smallpox, cholera, scarlet fever, diphtheria or contagious or infectious disease that is a menace to the public health, said telegram to be paid by the State board of health. (Compiled Statutes 1910, sec. 2942.)

County health officer.—Whenever in any county a case of smallpox, cholera, typhoid fever, scarlet fever, diphtheria, or other epidemic or contagious or infectious disease is known to exist, it is the duty of the county health officer to immediately notify the secretary of the State board of health. (Compiled Statutes, 1910, sec. 2936).

When typhoid fever appears on any premises from which milk is sold, the health officer shall at once report the same to the State board of health. (Rules and regulations, State board of health, 1909.)

County health officers are required to report all cases of communicable diseases reported to them to the State board of health. (Ibid.)

CERTAIN FEATURES PECULIAR TO THE VARIOUS STATE AND TERRITORIAL LAWS.

ALABAMA.

The Medical Association of the State of Alabama constitutes the State board of health and elects the State health officer.

The county medical societies in affiliation with the State association constitute boards of health for their respective counties and are the only local boards of health, others being prohibited. The county board in each county elects a county health officer, and a health officer for each incorporated city and town.

Beriberi and Chagres fever are among the notifiable diseases.

ARKANSAS.

The jurisdiction of boards of health of cities with over 2,500 inhabitants extends 1 mile beyond the city limits, except in the time of epidemic, when, for quarantine purposes, it extends 5 miles.

There appears to be no requirement for the reporting of sickness.

CALIFORNIA.

Syphilis and gonococcus infection are included among the diseases required by law to be reported by physicians to the local health authorities and by the local health authorities to the State board of health.

Physicians are required to report to the State board of health cases of poisoning by lead, phosphorus, arsenic, or mercury, or their compounds, cases of anthrax, and cases of compressed-air illness, contracted as a result of the nature of the patient's employment, and are entitled to a fee of 50 cents for each such report. (Acts of 1911, ch. 485, sec. 1.)

CONNECTICUT.

The county health officers are attorneys at law, appointed by the judges of the superior court.

DELAWARE.

The governor appoints three physicians in each county to be health officers of the county.

FLORIDA.

Physicians report cases of the notifiable diseases direct to the State health officer, or State board of health—cases of yellow fever, smallpox, and cholera being reported by telegram at State expense. No State provision is made for local health officers or boards, excepting that made in the charters of certain cities.

ILLINOIS.

The council and trustees of cities and villages have for sanitary purposes jurisdiction extending one-half mile beyond the corporation limits.

IOWA.

Cases of the notifiable diseases are in cities and towns reported to the mayor, outside of cities and towns to the clerk of the township.

KENTUCKY.

The law specifies that reports of cases of the notifiable diseases shall be made to the county board of health or some member of the board.

LOUISIANA.

The sanitary code specifies that whenever a quarantinable disease breaks out within the State the president of the State board of health is to immediately notify the health authorities of surrounding States and the Surgeon General of the Public Health and Marine-Hospital Service.

MASSACHUSETTS.

The State is divided into 14 health districts with a State inspector of health in each district.

MICHIGAN.

For each complete report of a notifiable disease made by a physician to the local health authorities the physician is entitled to receive the sum of 10 cents from the township, city, or village in which the notice was given.

For cases of tuberculosis physicians are required to report in addition to the name, age, sex, color, nativity, and address of the patient also the occupation engaged in at the time the disease was contracted and each subsequent occupation engaged in up to the time of recovery or death. When a patient recovers, the fact is also to be reported.

MISSISSIPPI.

Reports of cases of the notifiable diseases are to be made direct to the secretary of the State board of health.

MISSOURI.

There appears to be no State requirement for the reporting of sickness by physicians.

NEVADA.

There appears to be no requirement for the reporting of sickness.

NEW JERSEY.

Physicians attending cases of typhoid fever, dysentery, scarlet fever, diphtheria or tuberculosis on any dairy premises where milk is produced for sale or distribution. or in any household any member of which is employed at such a dairy, are required to report the cases to the State board of health within 12 hours.

Physicians and householders are entitled to the sum of ten cents for each case of a notifiable disease reported by them. Local authorities are entitled to the same amount for each case reported by them to the state board of health.

NEW MEXICO.

Outside of incorporated cities and towns reports of cases of the notifiable diseases are made to the justice of the peace of the precinct.

NEW YORK.

The physician or other person who reports a case of a notifiable disease is entitled to the sum of 25 cents therefor.

Health officers of villages and towns are paid by their respective village or town a sum not to exceed 20 cents for each case of notifiable disease reported by them to the State department of health.

SOUTH CAROLINA.

Physicians outside of incorporated cities and towns report cases of the notifiable diseases direct to the secretary of the State board of health.

TENNESSEE.

Boards of health of cities have jurisdiction and authority in the territory extending for 1 mile beyond the corporation limits.

UTAH.

The laws of Utah make the penalty for the willful violation of the law in regard to the reporting of infectious diseases the cancellation or revocation of the practitioner's license. (Utah Compiled Laws 1907, sec. 1735–1736, as amended by acts of 1911, ch. 93.)

Physicians are required to report immediately to the local board of health cases of venereal disease.

Upon the notification of a case of inflammation of the eyes in a newly born child the local health officer is required to report immediately by telephone or telegraph to the State board of health.

WASHINGTON.

The State board of health may remove from office any health officer who refuses or neglects to make prompt and accurate reports to the county health officer or to the State board of health.

Diseases notifiable in each of the States and Territories.

[The plus signs (+) indicate the notifiable diseases.]

	States.	Actinomycosis.	Anthrax.	Beriberi.	Cancer.	Cerebro-spinal meningitis.	Chagres fever.	Chicken pox.	Cholera (Asiatic).	Dengue.	Diphtheria.	Dysentery.	Epidemic dysentery.	Erysipelas.	Favus.	German measles.	Glanders.	Gonococcus infection.	Leprosy.	Malaria.	Measles.	Mumps.	Ophthalmia neonatorum.	Pellagra.	Plague.	Pneumonia.	Poliomyelitis.
1	Alabama			+		+	+		+		+						+		+						+		
2	Alaska																										
3	Arizona																										
4	Arkansas																										
5	California [1]		+	+		+		+	+	+	+	+		+		+	+	+	+		+	+		+	+	+	+
6	Colorado								+		+																
7	Connecticut [2]								+		+								+				+				
8	Delaware																										
9	District of Columbia					+		+	+		+						+		+		+		(3)		+		+
10	Florida								+		+								+								
11	Georgia								+		+																
12	Hawaii [4]					+		+	+	+	+								+		+				+		+
13	Idaho					+		+	+		+					+			+		+		(5)		+		+
14	Illinois [6]		+						+		+						+		+				(5)		+		
15	Indiana							+	+		+								+		+		(3)		+		
16	Iowa					+			+		+								+				(5)		+		+
17	Kansas					+			+		+																
18	Kentucky								+		+																
19	Louisiana									+													(3)			+	
20	Maine					+			+		+										+		(7)				+
21	Maryland										+										+	+	(5)				
22	Massachusetts	+	+			+		+	+		+						+		+		+		+				+
23	Michigan [8]					+			+		+										+		(5)			+	

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[1] California.—Medical practitioners are also to report cases of certain occupation diseases, see page 14.

[2] Connecticut.—See also statement of the secretary of the State board of health, page 16.

[3] When no physician is in attendance, cases of ophthalmia neonatorum are to be reported to the local health officer by the midwife, nurse, or other person in charge of the child. Where a physician is in attendance the case is not reported.

[4] Hawaii.—In addition follicular conjunctivitis, amoebic dysentery and paratyphoid fever are required to be reported.

[5] Cases of ophthalmia neonatorum are to be reported either to a physician or to the local health officer by the nurse, or other person in charge of the child.

[6] Illinois.—Requires certain occupation diseases to be reported also, see page 23.

[7] Maine.—Cases of ophthalmia neonatorum are to be reported to a physician by the nurse or other attendant.

[8] Michigan.—Physicians are also to report cases of certain occupation diseases, see page 33.

Diseases notifiable in each of the States and Territories—Continued.

	States.	Actinomycosis.	Anthrax.	Beriberi.	Cancer.	Cerebro-spinal meningitis.	Chagres fever.	Chicken pox.	Cholera (Asiatic).	Dengue.	Diphtheria.	Dysentery.	Epidemic dysentery.	Erysipelas.	Favus.	German measles.	Glanders.	Gonococcus infection.	Leprosy.	Malaria.	Measles.	Mumps.	Ophthalmia neonatorum.	Pellagra.	Plague.	Pneumonia.	Poliomyelitis.
24	Minnesota					+					+										+		+				+
25	Mississippi[1]								+	+																	
26	Missouri																										
27	Montana					+			+		+										+				+		
28	Nebraska					+		+	+		+								+		+		+				
29	Nevada																										
30	New Hampshire[2]								+		+										+						
31	New Jersey		+					+	+		+						+		+	+			(3)		+		+
32	New Mexico																										
33	New York[4]		+		+	+			+		+								+		+		+	+	+	+	+
34	North Carolina								+		+										+				+		
35	North Dakota																						(5)				
36	Ohio					+		+	+		+										+		(5)		+		+
37	Oklahoma																										
38	Oregon[6]					+			+		+								+		+		+		+		+
39	Pennsylvania	+	+			+		+	+		+		+	+		+	+		+	+	+	+	(5)	+	+	+	+
40	Porto Rico			+		+			+		+		+				+		+	+		+			+		
41	Rhode Island[7]					+																	(5)				+
42	South Carolina					+					+								+		+		+				+
43	South Dakota								+		+										+						+
44	Tennessee								+		+												(5)		+		+
45	Texas		+			+			+	+	+		+										(5)		+		
46	Utah[8]					+		+	+		+								+		+		+		+	+	+
47	Vermont																						+				
48	Virginia							+	+		+										+				+		+
49	Washington			+		+		+	+		+				+				+		+			+	+		+
50	West Virginia[9]								+		+																
51	Wisconsin					+		+	+		+			+					+		+		+		+		+
52	Wyoming								+		+																
	Number of States in which each disease is notifiable	2	7	4	1	21	1	14	37	5	39	1	3	3	1	3	8	1	21	3	24	4	10	4	22	6	21

[1] Mississippi.—In addition to the diseases enumerated it is specified that cases of other virulent epidemic contagious diseases shall be reported.

[2] New Hampshire.—In addition to the diseases enumerated malignant pestilential diseases and malignant communicable diseases are to be reported.

[3] When no physician is in attendance, cases of ophthalmia neonatorum are to be reported to the local health officer by the midwife, nurse, or other person in charge of the child. Where a physician is in attendance the case is not reported.

[4] New York.—Physicians are also to report cases of certain occupation diseases, see page 156.

[5] Cases of ophthalmia neonatorum are to be reported either to a physician or to the local health officer by the nurse or other person in charge of the child.

[6] Oregon.—Barber's itch is also reportable.

[7] Rhode Island.—Requires meningeal tuberculosis to be reported also.

[8] Utah.—Requires also that venereal diseases shall be reported, see page 58.

[9] West Virginia.—In addition other endemic, epidemic, infectious, or contagious diseases are to be reported.

Diseases notifiable in each of the States and Territories—Continued.

	States.	Puerperal fever.	Rabies.	Relapsing fever.	Rocky Mountain (spotted) fever.	Scarlet fever.	Smallpox.	Syphilis.	Tetanus.	Trachoma.	Trichiniasis.	Tuberculosis.					Typhoid fever.	Typhus fever.	Uncinariasis.	Whooping cough.	Yellow fever.	Contagious or infectious diseases dangerous to the public health.	Communicable diseases.	Contagious diseases.	Diseases dangerous to the public health.	Epidemic diseases.	Infectious diseases.	Pestilential diseases.
												All forms.	Communicable forms.	Abdominal.	Laryngeal.	Pulmonary.												
1	Alabama		+			+	+									+	+	+			+							
2	Alaska																											
3	Arizona																							+		+	+	
4	Arkansas																											
5	California [1]		+			+	+	+	+	+		+					+	+	+	+	+			+				
6	Colorado					+	+																		+			
7	Connecticut [2]					+	+					+					+	+			+			[3]+			[2]+	
8	Delaware																							+			+	
9	District of Columbia					+	+						+			+	+	+		+	+							
10	Florida					+	+														+							
11	Georgia					+	+											+			+							
12	Hawaii [4]						+		+	+		+					+	+		+	+		+		+		+	
13	Idaho					+	+										+	+		+	+							
14	Illinois [5]					+	+														+							
15	Indiana					+	+									+	+	+		+	+							
16	Iowa					+	+																					
17	Kansas					+	+					+													+			
18	Kentucky					+	+														+		+			+		
19	Louisiana						+									+					+			+			+	+
20	Maine					+	+					+					+	+		+								
21	Maryland					+	+								+	+	+	+		+	+	+						
22	Massachusetts					+	+		+	+	+	+					+	+		+	+							
23	Michigan [6]					+	+					+					+			+								
24	Minnesota					+	+					+					+											
25	Mississippi [7]						+									+					+							
26	Missouri																											
27	Montana				+	+	+										+	+			+							
28	Nebraska	+				+	+					+					+	+		+	+			+	+			
29	Nevada																											
30	New Hampshire [8]					+	+					+					+											
31	New Jersey		+			+	+			+	+	+					+	+			+							
32	New Mexico						+															+						
33	New York [10]		+			+	+		+						+	+	+	+		+	+							
34	North Carolina					+	+											+		+	+							
35	North Dakota																							+		+	+	

36	Ohio					+	+			+							+	+		+	+				+			
37	Oklahoma											+												+			+	
38	Oregon [11]					+	+					+					+	+			+					+	+	
39	Pennsylvania	+	+	+		+	+		+	+	+	+					+	+	+	+	+							
40	Porto Rico					+	+	+				+					+	+	+	+	+							
41	Rhode Island [12]						+								+	+								+			+	
42	South Carolina					+	+					+			+					+								
43	South Dakota					+	+																		+			
44	Tennessee					+	+											+			+		[5]+					
45	Texas					+	+			+		+					+	+			+							+
46	Utah [13]					+	+					+					+	+		+				+			+	
47	Vermont											+										+						
48	Virginia					+	+					+					+		+		+		+	+	+		+	
49	Washington					+	+			+				+		+	+	+	+	+	+							
50	West Virginia [14]					+	+					+																
51	Wisconsin [15]					+	+					+					+	+		+	+							
52	Wyoming					+	+																+					
	Number of States in which each disease is notifiable	2	5	1	1	38	43	2	5	8	3	22	1	1	4	9	26	25	5	19	29	3	5	12	7	4	11	2

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[1] California.—Medical practitioners are also to report cases of certain occupation diseases, see page 14.

[2] Connecticut.—See also statement of the Secretary of the State board of health, page 16.

[3] Connecticut.—Diseases of a venereal nature are excepted.

[4] Hawaii.—In addition follicular conjunctivitis, amoebic dysentery and peratyphoid fever are required to be reported.

[5] Illinois.—Requires certain occupation diseases to be reported also, see page 23.

[6] Michigan.—Physicians are also to report cases of certain occupation diseases, see page 33.

[7] Mississippi.—In addition to the diseases enumerated it is specified that cases of other virulent epidemic contagious diseases shall be reported.

[8] New Hampshire.—In addition to the diseases enumerated malignant pestilential diseases and malignant communicable diseases are to be reported.

[9] New Mexico.—Exception is made to venereal diseases.

[10] New York.—Physicians are also to report cases of certain occupation diseases, see page 156.

[11] Oregon.—Barber's itch is also reportable.

[12] Rhode Island.—Requires meningeal toberculosis to be reported also.

[13] Utah.—Requires also that venereal diseases shall be reported, see page 58.

[14] West Virginia.—In addition other endemic, epidemic, infectious, or contagious diseases are to be reported.

[15] Wisconsin.—It is understood that a law was enacted during the present year requiring the notification of certain occupation diseases, but a copy of the law has not been accessible.

Notifiable diseases and the health authorities to and through whom reported.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
1	Alabama	1, leprosy; 2, cholera; 3, typhus fever; 4, cerebrospinal meningitis; 5, yellow fever; 6, scarlet fever; 7, plague; 8, hydrophobia; 9, glanders; 10, smallpox; 11, diphtheria; 12, tuberculosis (pulmonary); 13, typhoid fever; 14, chagres fever; 15, beriberi.	1, physicians; 2, midwives and other persons to report suspected cases.	Local health officer	As soon as can be done	Municipal health officers are to report the presence of any of these diseases promptly to the committee of public health of the county board of health and to the State health officer. County health officers also are to report to the State health officer the presence of any of these diseases in their respective counties.
2	Alaska					
3	Arizona	1, contagious, epidemic, or infectious diseases.	Physicians or other persons	Local board of health	Immediately	The attending physician is to report twice each week the status of the case.
			Keepers of private houses, boarding houses, lodging houses, inns, or hotels.	Local board of health	Within 24 hours	
		1, smallpox; 2, scarlet fever; 3, diphtheria; 4, other infectious or contagious diseases.	Local boards of health (in cities, the city board; for the Territory outside of cities, the county board.)	Territorial board of health	Immediately	
4	Arkansas					The law makes it the duty of the State board of health to have general supervision over the registration of prevalent diseases.
5	California	1, cholera; 2, plague; 3, yellow fever; 4, leprosy; 5, diphtheria; 6, scarlet fever; 7, smallpox; 8, typhus fever; 9, typhoid fever; 10, anthrax; 11, glanders; 12, epidemic cerebrospinal meningitis; 13, tuberculosis; 14, pneumonia; 15, dysentery; 16, erysipelas; 17, uncinariasis;	Physicians, nurses, or other persons having charge of or caring for cases.	Local board of health, or health officer.	At once	
			1, local health officers; 2, members of local boards of health; 3, coroners.	State board of health	At once	

		18, trachoma; 19, dengue; 20, tetanus; 21, measles; 22, German measles; 23, chicken pox; 24, whooping cough; 25, mumps; 26, pellagra; 27, beriberi; 28, syphilis; 29, gonococcus infection; 30, rabies; 31, poliomyelitis.				
			Physicians, nurses, clergymen, attendants, etc.	Local health officer or board of health.	Promptly	
		1, infectious, contagious, and communicable diseases.	1, boards of health of cities and towns, and the chief executive health officer where there is no municipal or town board of health; 2, county health officers.	State board of health	On or before the 5th day of each month.	
		1, plague; 2, Asiatic cholera; 3, yellow fever; 4, typhus fever.	Local boards of health and health officers.	Secretary of the State board of health.	Immediately by telegraph.	
		Poisoning by lead, phosphorus, arsenic, or mercury, or their compounds, anthrax and compressed-air illness when contracted as a result of the nature of the patient's employment.	Physicians	State board of health		
			State board of health	Commissioner of the bureau of labor statistics.		
6	Colorado	1, smallpox; 2, or any other disease dangerous to the public health.	Householders	Local (city or county) health officer.	Immediately	City and county health officers are required to keep the secretary of the State board of health constantly informed respecting every outbreak of a disease dangerous to the public health.
		1, smallpox; 2, cholera; 3, diphtheria; 4, scarlet fever; 5, or other diseases dangerous to the public health.	Physicians	1, local board of health; 2, householder, hotel keeper, keeper of a boarding house or tenant within whose house or rooms the sick person happens to be.	Immediately	
7	Connecticut	1, cholera; 2, yellow fever; 3, typhus fever; 4, leprosy; 5, smallpox; 6, diphtheria; 7, membranous croup; 8, typhoid fever; 9, scarlet fever; 10, or other contagious or infectious diseases, except those of a venereal nature.	Physicians	Health officer of the town (township), city, or borough.	Within 12 hours after the nature of the disease has been recognized.	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
7	Connecticut (con.)	1, tuberculosis	1, physicians; 2, officers in charge of hospitals, dispensaries, asylums, and other similar institutions.	Health officer of the town (township), city, or borough.	Within 24 hours	
		1, malignant or contagious diseases.	Hotel and lodging-house keepers.	Local board of health	Within 12 hours	
		Ophthalmia neonatorum	Midwife, nurse, or attendant	Local health authority	Within 6 hours	
		1, smallpox; 2, cholera; 3, or any epidemic of infectious disease.	Local health officers	Secretary State board of health.	Immediately	
		Contagious diseases reported	Health officers of towns (townships), cities, and boroughs.	State board of health	On or before the 8th day of each month for the preceding calendar month.	
		Rabies	Local health officers	Commissioner of domestic animals.	Within 24 hours	
8	Delaware	Contagious or infectious diseases.	Physicians, dentists, veterinary surgeons, or others practicing medicine.	Local or State board of health.	Promptly	
		Disease dangerous to the public health required by the State board of health to be reported.	Physician or other person having knowledge.	Nearest health authority		
		Contagious or infectious diseases.	Local health authorities	State board of health		
9	District of Columbia.	1, Asiatic cholera; 2, yellow fever; 3, typhus fever; 4, smallpox; 5, leprosy; 6 plague; 7, glanders.	1, physician in attendance; or 2, the head of the family; or 3, the nearest relative present; or 4, any person in attendance.	Health officer	Immediately	
		8, diphtheria; 9, scarlet fever; 10, measles; 11, whooping cough; 12, chicken pox; 13 cerebro-spinal meningitis;	1, physician in attendance; or 2, the head of the family; or 3, the nearest relative present; or 4, any person in at-	Health officer		When the case terminates the person in charge is to report the fact to the health officer.

		14, typhoid fever; 15, poliomyelitis.	tendance.			
		Tuberculosis (pulmonary) or other communicable forms.	1, physicians; 2, officers having charge of hospitals, dispensaries, asylums, and similar institutions.	Health officer	Within 1 week after the disease is recognized.	
		Ophthalmia neonatorum	Midwife or other person in attendance at childbirth other than a registered physician.	Health officer	In writing so that the report shall be received within 6 hours by the health officer.	Physicians are not required to report.
10	Florida	1, yellow fever; 2, smallpox; 3, cholera.	Physicians	1, President of the State board of health; 2, city or county authorities.	Immediately	The report to the State board is to be made by telegram at State expense or in the most expeditious manner.
		1, diphtheria; 2, leprosy; 3, scarlet fever.	1, physicians; or 2, any person having charge of or upon whose premises the case exists.	1, State health officer; or 2, an agent of the State board of health.	Immediately by first mail.	
11	Georgia	1, smallpox; 2, Asiatic cholera; 3, yellow fever; 4, typhus fever; 5, scarlet fever; 6, diphtheria; 7, membranous croup.	1, physicians; 2, householders; 3, heads of families; 4, county or municipal authorities.	Local board of health, or its proper officer.	Immediately	
		1, Asiatic cholera; 2, yellow fever; 3, scarlet fever; 4, smallpox; 5, diphtheria; 6, typhus fever; 7, typhoid fever; 8, such other contagious, or infectious diseases as the State board of health may from time to time specify.	1, local boards of health; 2, physicians in localities where there are no health authorities.	State board of health	Promptly	The discovery of the presence of these diseases is to be reported and not the cases themselves.

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
12	Hawaii	1, cerebrospinal meningitis; 2, cholera; 3, follicular conjunctivitis; 4, diphtheria; 5, amœbic dysentery; 6, typhoid fever; 7, paratyphoid fever; 8, leprosy; 9, measles; 10, dengue; 11, poliomyelitis; 12, whooping cough; 13, plague; 14, scarlet fever; 15, tetanus; 16, trachoma; 17, tuberculosis; 18, typhus fever; 19, chickenpox; 20, smallpox; 21, yellow fever, or any other infectious or communicable disease or disease dangerous to the public health.	Physicians	Board of health or its nearest agent.	Immediately, in writing	The recovery of cases of tuberculosis is also to be reported.
			Householders, keepers of boarding or lodging houses, masters of vessels, police officers.	Board of health or its nearest agent.	Immediately	Superintendents of institutions are to report cases of tuberculosis coming under their care within 24 hours.
		1, smallpox; 2, scarlet fever; 3, diphtheria; 4, plague; 5, cholera; 6, yellow fever; 7, typhus fever; 8, cerebrospinal meningitis; 9, amœbic dysentery.	Physicians	Board of health or its nearest agent.	Immediately, by telephone or by direct oral communication.	This is in addition to the report in writing.
		Leprosy—known or suspected.	Any and every person	Board of health or its agent	Forthwith	
13	Idaho	1, Asiatic cholera; 2, yellow fever; 3, smallpox; 4, chicken pox; 5, typhus fever; 6, leprosy; 7, bubonic plague; 8, diphtheria; 9, scarlet fever; 10, typhoid fever; 11, measles (including rotheln); 12, whooping cough; 13, cerebro-spinal meningitis; 14, infantile paralysis.	1, physicians; 2, in the absence of an attending physician, the owner or agent of the building in which the case occurs, or the head of the family is to report.	Local board of health	Within 24 hours	Health reports of municipal boards of health must be transmitted to the county board of health quarterly, and the secretary of the county board is to make a quarterly report to the State board of health, containing a summary of contagious and infectious diseases.
		Ophthalmia neonatorum	Midwife, nurse, or other person having charge.	Local health officer or physician.	Within 6 hours	

14	Illinois	1, smallpox; 2, scarlet fever; 3, diphtheria; 4, Asiatic cholera; 5, yellow fever; 6, plague; 7, glanders; 8, anthrax; 9, leprosy.	1, attending physician; or 2, the householder in whose dwelling the case occurs.	Local health authorities	Immediately	
			Local health authorities	Secretary of the State board of health.	The first case immediately and the progress of outbreaks at least once a week.	
		Ophthalmia neonatorum	Midwife or nurse having charge of infant.	Local health officer or physician.	Within 6 hours	
		Disease or illness due or incident to occupation.	Physicians making physical examination of employees for occupation diseases.	State board of health	Immediately	
			Secretary of State board of health.	State department of factory inspection.	Immediately	
15	Indiana	1, yellow fever; 2, smallpox; 3, cholera; 4, diphtheria; 5, membranous croup; 6, scarlet fever; 7, measles; 8, typhus fever; 9, plague; 10, leprosy; 11, tuberculosis (pulmonary); 12, typhoid fever; 13, chicken pox; 14, whooping cough.	1, physicians and midwives; 2, householder or person having case in charge.	1, in cities and towns to the city or town health officer; 2, outside of cities and towns to the county health officer or his deputies.	Immediately	
			Town and city health officers	County health commissioner.	By the 2d of each month forwards the original reports received during the preceding month.	
		1, typhoid fever; 2, scarlet fever; 3, smallpox; 4, diphtheria; 5, membranous croup.	County health commissioners.	State board of health	By the 8th day of each month for the preceding month.	County health commissioners also make a quarterly report of contagious diseases to the State board of health.
		Ophthalmia neonatorum when no physician is in attendance.	Parents or persons in charge of infant.	Local health officer	Within 6 hours	
16	Iowa	1, scarlet fever; 2, diphtheria; 3, smallpox; 4, cholera; 5, leprosy; 6, cerebrospinal meningitis; 7, plague; 8, poliomyelitis.	1, attending physician; or 2, in his absence by the householder of the premises wherein the disease exists.	1, mayor of the city or town; 2, clerk of the township if outside of a municipality.	An immediate report to be made, followed within 24 hours by a written notice of the case.	
			1, mayors of municipalities; 2, clerks of townships.	Secretary of the State board of health.	Within 24 hours, and by the 1st of February for the preceding calendar year.	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
16	Iowa—(contd.) ...	Ophthalmia neonatorum......	Midwife, parent, guardian, nurse, or other person having charge of the infant.	Health officer or some legally qualified practitioner.	Within 6 hours...........	
17	Kansas....	1, cholera; 2, smallpox; 3, scarlet fever; 4, diphtheria; 5, cerebrospinal meningitis; or 6, any disease dangerous to the public health.	1, physician; 2, householders to report cases in their families.	Nearest board of health or health officer.	....	Municipal and county boards of health and health officers having knowledge of any contagious or infectious disease within their jurisdiction are required to communicate without delay the facts to the State board of health.
		Tuberculosis..................	1, physicians; 2, chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar private or public institution.	1, county health officer; or 2, in cities of the first class to the city health officer.	Within 24 hours..........	
18	Kentucky........	1, cholera; 2, smallpox; 3, yellow fever; 4, scarlet fever; 5, diphtheria; and 6, other epidemic and communicable diseases.	1, physicians to report cases in their practice; 2, heads of families to report cases in their families.	1, county board of health or to some member of the board.	Within 24 hours	
			County boards of health.......	State board of health:.......	At least once in 3 months..	
19	Louisiana.........	Diseases of an infectious, contagious, or pestilential nature.	Physicians....................	Local board of health.......	Within 24 hours...........	
		Smallpox.....................	1, attending physician; or 2, the head of the household or manager of the hotel, lodging house, or camp where the case occurs, when no physician is in attendance.	Health officer having jurisdiction, or in the absence of such health officer, the president of the State board of health.	Immediately..............	
		Consumption.................	Physicians....................	Municipal or parish health officer.	Immediately	
			Parish health officer...........	State board of health........	Quarterly.................	
		Ophthalmia neonatorum......	Nurse, midwife, or other person not a legally qualified practitioner of medicine.	Town or parish health officer.	Within 12 hours..........	

		Pneumonia	1, attending physician; or 2, in his absence by the head of the household.	Local health officer	Promptly	
		Dengue	Attending physician	Local health officer	Within 24 hours	
		Yellow fever	Municipal and parish health officers.	President State board of health.	Immediately	
			Local board of health	State board of health	Weekly	
		Quarantinable diseases	State board of health	1, health authorities of surrounding States; 2, Surgeon General of the Public Health and Marine-Hospital Service	Immediately	
20	Maine	1, smallpox; 2, diphtheria; 3, scarlet fever; 4, cholera; 5, typhus fever; 6, typhoid fever; 7, cerebrospinal meningitis; 8, measles; 9, membranous croup; 10, whooping cough.	Householders	1, health officer of the town; or 2, the secretary of the local board of health.	Within 24 hours	
		Tuberculosis	1, physicians; 2, chief officer having charge for the time being of any hospital, dispensary, asylum, sanatorium, or other similar private or public institution.	Secretary State board of health.	Within 48 hours	The State board of health is to keep a register of persons affected with tuberculosis.
		1 smallpox; 2, diphtheria; 3, scarlet fever; 4, typhoid fever; 5, cerebrospinal meningitis; 6, measles; 7, membranous croup; 8, whooping cough; 9, tuberculosis (pulmonary).	Local boards of health	State board of health	Promptly	
		Ophthalmia neonatorum	Midwife, nurse, or person in charge.	Legally qualified practitioner of medicine.	At once	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
21	Maryland	1, smallpox; 2, diphtheria; 3, membranous croup; 4, scarlet fever; 5, typhoid fever; 6, typhus fever; 7, yellow fever; 8, measles; 9, whooping cough; 10, any other contagious or infectious disease dangerous to the public health.	Physicians	Board of health of the city, town, or county.	Immediately	
		1, pulmonary or laryngeal tuberculosis.	Physicians	Secretary of the State board of health.	Within 7 days	The State board of health is to keep a register of all persons known to be affected with tuberculosis.
			The superintendent or other person in charge or control of any hospital, dispensary, school, reformatory, or other institution deriving the whole or any part of its support from the public funds of the State or of any city, town, or county.	State board of health	Weekly on Monday for the preceding week.	
		1, smallpox; 2, diphtheria; 3, membranous croup; 4, scarlet fever; 5, typhoid fever; 6, typhus fever; 7, measles; 8, mumps; 9, whooping cough; 10, any other infectious or contagious disease dangerous to the public health.	Householder	Board of health of the city or county.	Immediately	
		1, smallpox; 2, cholera; 3, yellow fever; 4, typhus fever; 5, typhoid fever; 6, scarlet fever; 7, leprosy; 8, any other infectious or contagious disease occurring on the premises under their management.	Hotel keepers, keepers of boarding houses and lodging houses, superintendents, managers, or directors of private or public institutions of any kind.	Health officer of the city or town or in the absence of such an officer to the secretary of the State board of health.	Immediately in writing	
		1, smallpox; 2, any other contagious or infectious disease	Boards of health of cities, towns, and counties.	State board of health	Within 24 hours	In practice local boards of health report to the State

		dangerous to the public health.				board of health once a month cases of smallpox, diphtheria, typhoid fever, scarlet fever, measles, whooping cough, and mumps, and other diseases irregularly. Local boards of health are also required to report promptly to the State board of health the existence of any epidemic or unusual sickness.
		Ophthalmia neonatorum......	Midwife, nurse, or other person in charge.	Local health officer or a physician.	Immediately.............	
22	Massachusetts.....	1, actinomycosis; 2, anterior poliomyelitis; 3, Asiatic cholera; 4, cerebro-spinal meningitis; 5, diphtheria; 6, glanders; 7, leprosy; 8, malignant pustule; 9, measles; 10, ophthalmia neonatorum; 11, scarlet fever; 12, smallpox; 13, tetanus; 14, trachoma; 15, trichinosis; 16, tuberculosis; 17, typhoid fever; 18, typhus fever; 19, varicella; 20, whooping cough; 21, yellow fever.	Householder..................	Board of health of the city or town (township).	Forthwith................	
			Physician....................	Selectmen or board of health of the town (township).	Immediately.............	
			Boards of health of cities and towns (townships).	State board of health........	Within 24 hours..........	
		Inflamed eyes in infants under 2 weeks of age.	Nurses, relative, or other attendant.	Board of health of the city or town (township).	Within 6 hours...........	
23	Michigan..........	1, pneumonia; 2, tuberculosis; 3, typhoid fever; 4, meningitis; 5, diphtheria; 6, whooping cough; 7, scarlet fever; 8, measles; 9, smallpox; 10, cholera. (See "Remarks.")	Physician....................	1, health officer of the township, city, or village; 2, householder, hotel keeper, keeper of a boarding house, or tenant within whose house or rooms the cases occur.	Immediately.............	
			Householder, hotel keeper, keeper of a boarding house, or tenant having cases in his family or on his premises.	Local health officer..........	Immediately.............	By regulation the following-named diseases are to be reported for statistical purposes: Tetanus, rabies, cancer, erysipelas, and leprosy.
			Health officers of cities, villages, and townships.	Secretary of the State board of health.	Constantly informed respecting the outbreak.	
		Tuberculosis..................	1, physicians; 2, chief officer having charge for the time being of any asylum, hospital, dispensary, or other similar private or public institution.	Local health officer..........	Within 24 hours..........	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
23	Michigan (contd.).	Inflamed eyes of infants under 2 weeks of age.	Mid wives, nurses, or other persons in charge of the infant.	Local health officer or a physician.	Within 6 hours.	
		1. Poisoning by lead, phosphorus, arsenic, or mercury, or their compounds.	Physicians.	State board of health.		
		2. Anthrax. 3. Compressed-air illness when contracted as a result of the patient's employment.	State board of health.	Commissioner of labor.		
24	Minnesota.	1, smallpox; 2, cerebro-spinal meningitis; 3, anterior poliomyelitis; 4, scarlet fever; 5, diphtheria; 6, measles.	Physicians.	Local health officer.	Immediately.	
		Tuberculosis, typhoid fever.	Physicians.	State board of health.	Within 1 week.	
		1, smallpox; 2, scarlet fever; 3, diphtheria; 4, cerebrospinal meningitis; 5, anterior poliomyelitis; 6, measles; 7, typhoid fever; 8, tuberculosis.	Local health officer.	Secretary of the State board of health.	Immediately.	
		Ophthalmia neonatorum.	Midwife, nurse, parent, or other person having charge of the infant.	Local health officer.	Within 12 hours.	
25	Mississippi.	1, yellow fever; 2, cholera; 3, dengue; 4, smallpox; 5, or other virulent, epidemic, contagious disease.	Physicians.	Secretary of State board of health.	Immediately.	
		Tuberculosis, consumption, and other pulmonary diseases.	Physicians.	Secretary of State board of health.	Within 10 days.	
26	Missouri.	1, smallpox; 2, diphtheria; 3, membranous croup; 4, scarlet fever; 5, typhus fever; 6, yellow fever; 7, cholera; 8, plague; 9, leprosy.	County health officer.	Secretary of State board of health.	1, immediately; 2, quarterly.	

27	Montana	1, smallpox; 2, diphtheria; 3, scarlet fever; 4, cholera; 5, plague; 6, yellow fever; 7, Rocky Mountain, spotted, or tick fever; 8, typhus fever; 9, typhoid fever; 10, cerebrospinal meningitis; 11, measles.	1, householders; 2, physicians	Health officer of the town, city, or county.	Immediately	
			City, town, and county health officers.	Secretary of the State board of health.	On or before the 5th day of each month for the preceding calendar month.	
28	Nebraska	1, Asiatic cholera; 2, yellow fever; 3, smallpox; 4, diphtheria; 5, scarlet fever; 6, measles; 7, typhus fever; 8, ophthalmia neonatorum; 9, typhoid fever; 10, cerebrospinal meningitis; 11, leprosy; 12, whooping cough; 13, chickenpox; 14, tuberculosis; 15, puerperal fever; 16, or any other disease contagious or dangerous to the public health.	1, physicians; 2, where no physician is in attendance the responsibility for the reporting of the case falls upon any person having charge, or the head of the family or any person having the care or custody of any lodging rooms in which cases occur; 3, school-teachers.	1, local board of health; 2, where no local board of health is organized, the report is to be made to the State board of health.	Within 24 hours by the most expedient method.	
			Local board of health	State board of health	From time to time	
29	Nevada					
30	New Hampshire	1, smallpox (diagnosed or suspected); 2, cholera; 3, diphtheria; 4, scarlet fever; 5, or other malignant pestilential disease.	Physicians	1, health officer of the town (township); 2, or in his absence to the selectmen of the town (township).	Immediately	
		1, smallpox; 2, diphtheria; 3, membranous croup; 4, scarlet fever; 5, typhoid fever; 6, measles; 7, or any other malignant communicable disease.	If no physician is in attendance, report to be made by any person who knows or has reason to believe that any member of his family or household (boarder, roomer, or visitor) is affected.	Local board of health	Within 24 hours	
			Local board of health	State board of health	Immediate report of the first appearance of the disease and a weekly report thereafter as long as the disease continues.	
		Tuberculosis	Physicians, and officers in charge of hospitals and institutions.	State board of health	Within 1 week	The recovery of cases is also to be reported.

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
31	New Jersey	1, cholera; 2, yellow fever; 3, typhus fever; 4, leprosy; 5, plague; 6, trichinosis; 7, smallpox; 8, typhoid fever; 9, diphtheria; 10, membranous croup; 11, scarlet fever; 12, poliomyelitis; 13, trachoma; 14, rabies; 15, glanders; 16, anthrax; 17, chicken pox; 18, tuberculosis; 19, malaria.	1, physician; 2, when no physician is in attendance the report is to be made by the house owner or the householder.	Local board of health or, in the absence of such board, the assessor of the township.	Within 12 hours	
			Local board of health or, in the absence of such board, the assessor of the township.	State board of health	At least once a week and daily when required by the State board.	
		Tuberculosis	1, physicians; 2, chief officer having charge for the time being of any hospital, asylum, prison, or other private or public institution.	Local board of health	Within 48 hours	
		1, typhoid fever; 2, dysentery; 3, scarlet fever; 4, diphtheria; 5, tuberculosis.	Physicians are to report cases occurring on dairy premises where milk is produced for sale or distribution or in households of which any member is employed on any dairy premises.	State board of health	Within 12 hours	
		Inflamed eyes in infants under 2 weeks of age.	When no physician is in attendance, the midwife, nurse, attendant, or relative having charge of the infant.	Local board of health	Within 6 hours	
32	New Mexico	1, smallpox; 2, or other contagious or infectious disease dangerous to the public health.	1, physician; 2, householder or other person.	1, county health officer, if within a city, town, or village; 2, justice of the peace of the precinct, if outside of a city.	At once	
33	New York	1, poliomyelitis; 2, anthrax; 3, plague; 4, cancer; 5, cerebrospinal meningitis; 6, cholera; 7, diphtheria; 8, hydrophobia; 9, leprosy; 10, measles;	1, physician; 2, when no physician is in attendance, the report is to be made by the superintendent or other officer of an institution, hospital,	Health officer of the city, village, or town (township).	Immediately	The physician or other person making the report is entitled to the sum of 25 cents therefor.

		11, ophthalmia neonatorum; 12, pellagra; 13, pneumonia; 14, scarlet fever; 15, smallpox; 16, tetanus; 17, tuberculosis (pulmonary or laryngeal); 18, typhoid fever; 19, typhus fever; 20, whooping cough; 21, yellow fever.	or hotel or lodging-house keeper, or other person where the case occurs.			
			Health officers of cities, villages, and towns (townships).	State department of health..	Once a month............	Health officers of villages and towns (townships) are to be paid a sum not to exceed 20 cents for each case reported.
		Poisoning from lead, phosphorus, arsenic, or mercury, or their compounds, or from anthrax, or from compressed-air illness contracted as the result of the nature of the patient's employment.	Physicians....................	Commissioner of labor		
		Smallpox....................	Local boards of health.........	State department of health..	Promptly.................	
		1, smallpox; 2, typhus fever; 3, yellow fever; 4, cholera.	Health officers, commissioners of health, or boards of health of cities of the first class (population over 175,000).	State department of health..	Promptly.................	
34	North Carolina....	1, smallpox; 2, diphtheria; 3, scarlet fever; 4, typhus fever; 5, yellow fever; 6, cholera; 7, measles; 8, whooping cough; 9, plague.	1, physician; 2, householders..	Quarantine officer or his deputy.	Immediately.............	
			Deputy quarantine officer of township.	County quarantine officer...	At once..................	
			Quarantine officers (county and city).	Secretary State board of health.	By 5th of month for preceding month.	
		1, plague; 2, yellow fever; 3, typhus fever; 4, cholera.	Quarantine officers............	Secretary State board of health.	By telegram within 24 hours.	
35	North Dakota.....	Infectious or contagious diseases.	Physician.....................	1, local health officer; 2, clerk of the civil township, or, in counties not under township organization, to the county commissioner.	Immediately.............	
		Contagious, epidemic, or infectious diseases.	Physician or other person.....	Local board of health........	Immediately.............	Physicians are to report to the local board of health not less than twice each week the condition of each person affected and the state of the disease.

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
35	North Dakota continued).	Contagious, epidemic, or infectious diseases (continued).	1, each keeper of a private house, boarding house, lodging house, inn, or hotel to report cases on his premises; 2, in the absence of a physician it is the duty of parents to report cases occurring in their households; 3, also the oldest person next of kin, the keeper or other proper officer of every workhouse, poorhouse, reform school, jail, prison, hospital, asylum, or other public or charitable institution to report cases among persons under his charge.	Local board of health.......	Within 24 hours...........	
		Ophthalmia neonatorum......	When no physician is in attendance cases are to be reported by the parents or persons having charge of the infant.	Health officer having jurisdiction.	Within 6 hours in writing.	Physicians and recognized hospitals are not required to report.
		Contagious and infectious diseases.	1, health officers of cities; 2, clerks of organized civil townships; 3, county commissioners in counties not under township organization.	County superintendent of health.	Not later than the 10th day of each month for the preceding month.	
			County superintendent of health.	State superintendent of health.	1, immediately; 2, on or before the 15th of each month for the preceding month.	
			State superintendent of health.	Governor of the State.......	Dec. 1 of each even-numbered year for preceding 2 years.	

		1, smallpox; 2, scarlet fever; 3, diphtheria; 4, or other infectious or contagious diseases.	Local board of health..........	State board of health........	Immediately..............	
36	Ohio..............	1, smallpox; 2, cholera; 3, plague; 4, yellow fever; 5, typhus fever; 6, diphtheria; 7, membranous croup; 8, scarlet fever; 9, typhoid fever; 10, cerebrospinal meningitis; 11, chicken pox; 12, measles; 13, whooping cough; 14, poliomyelitis; 15, any other disease dangerous to the public health; 16, trachoma.	1, physician or other person attending cases; 2, owners or agents of buildings in which cases occur; 3, heads of families in which cases exist.	Health officer..............	....	
		1, cholera; 2, plague; 3, cerebrospinal meningitis; 4, chicken pox; 5, diphtheria; 6, measles; 7, membranous croup; 8, scarlet fever; 9, smallpox; 10, typhoid fever; 11, typhus fever; 12, whooping cough; 13, poliomyelitis.	Boards of health of cities, villages, and townships.	State board of health........	Semimonthly on 1st and 16th of each month.	
		Ophthalmia in infants under 10 days old.	Midwives, nurses, or relatives..	Physician or local health officer.	Within 6 hours...........	
37	Oklahoma........	Infectious and contagious diseases.	Physicians....................	1, county superintendent of public health if outside city of first class; 2, city superintendent of public health if in city of first class.	The law requires an immediate report. The regulations promulgated by the State commissioner of health require reports monthly on the last day of the month.	
		Tuberculosis..................	1, physician; 2, chief officer having charge for the time being of any hospital, dispensary, or asylum, or other similar public or private institution.	Health officer for the city, town, or village.	Within 24 hours..........	
		Infectious and contagious diseases.	City and county superintendents of health.	State commissioner of health.	On the 10th day of each month for the preceding calendar month.	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
38	Oregon	1, diphtheria; 2, membranous croup; 3, scarlet fever; 4, cholera; 5, typhus fever; 6, typhoid fever; 7, smallpox; 8, measles; 9, cerebrospinal meningitis; 10, ophthalmia neonatorum; 11, infantile paralysis; 12, bubonic plague; 13, leprosy; 14, barber's itch; 15, tuberculosis.	Physicians	County or municipal health officer.	Within 24 hours by the quickest means of communication.	
			Superintendents of State institutions, children's homes, and other institutions of a public nature.	Secretary State board of health.	Not later than the 10th day of each month for the preceding month.	
		1, cholera; 2, yellow fever; 3, smallpox; 4, diphtheria; 5, membranous croup; 6, scarlet fever; 7, typhus fever; 8, typhoid fever; 9, "bubonic" (sic); 10, or any other contagious disease.	Physicians, or in the absence of a physician, the householder.	Health officer having jurisdiction.	In writing within 24 hours, giving the name and residence of the patient.	
		Infectious diseases	County boards of health and city health officers.	Secretaty State board of health.	Not later than the 10th day of each month for the preceding month.	All cases of smallpox or other contagious disease of alarming proportions must be reported at once.
39	Pennsylvania	1, actinomycosis; 2, anthrax; 3, plague; 4, cerebrospinal meningitis; 5, chicken pox; 6, cholera; 7, diphtheria; 8, dysentery (epidemic); 9, erysipelas; 10, German measles; 11, glanders; 12, hookworm disease; 13, leprosy; 14, malarial fever; 15, measles; 16, mumps; 17, pellagra; 18, pneumonia; 19, poliomyelitis; 20, puerperal fever; 21, rabies; 22, relapsing fever; 23, scarlet fever; 24, smallpox; 25, tetanus; 26, trachoma; 27, trichiniasis; 28, tuberculosis; 29, typhoid fever; 30, typhus fever; 31, whooping cough; 32, yellow fever.	Physicians	1, if in a township of the first class, borough, or city, report is made to the health authorities of the township, borough, or city; 2, if in a township of the second class, or in a city, borough, or township of the first class not having a board of health or body acting as such, the report is made to the State department of health.		
			1, health authorities of cities, boroughs, and townships of the first class; 2, superintendent and other persons in charge of asylums, hospitals, or other institutions	State department of health	At the end of each week and for the fraction of the week occurring at the end of each month.	

			located in townships of the second class.			
		Inflamed eyes in infants under 2 weeks of age.	Midwife, nurse, or other person having care of infant.	Health officer or legally qualified practitioner.	Within 6 hours	
40	Porto Rico	1, typhus fever; 2, typhoid fever; 3, smallpox; 4, varioloid; 5, scarlet fever; 6, diphtheria; 7, yellow fever; 8, cholera; 9, plague; 10, beriberi; 11, epidemic dysentery; 12, cerebrospinal meningitis; 13, whooping cough; 14, mumps; 15, malaria; 16, tuberculosis; 17, glanders; 18, leprosy; 19, cutaneous syphilis; 20, uncinariasis.	Physicians	Nearest health officer		
		Infectious or contagious diseases.	Physicians	Local health officer		
			Health officers	Director of sanitation	Immediately	
41	Rhode Island	1, smallpox; 2, or any other contagious or infectious distemper.	Householder to report cases in his house.	Town council	Immediately	
		Smallpox	Physicians, householders, or other persons to report any cases known.	1, town clerk; 2, if in cities, the superintendent of health.	Immediately	
		Tuberculosis (pulmonary or laryngeal).	Physicians	Secretary of the State board of health.	Within 7 days	The State board of health is to keep a register of all persons known to be affected with pulmonary or laryngeal tuberculosis.
			Superintendent or other person in charge or control of any hospital, school, reformatory, or other institution deriving the whole or any part of its support from the public funds of the State.	Secretary of the State board of health.	Cases to be reported each week.	
		1, Poliomyelitis; 2, tuberculous meningitis; 3, cerebrospinal meningitis.	Physicians	Secretary State board of health.	Immediately	
		Ophthalmia neonatorum	Midwife, nurse, or person having charge of the infant.	Health officer or some qualified practitioner of medicine.	Within 6 hours	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
42	South Carolina....	1, tuberculosis; 2, typhoid fever; 3, diphtheria; 4, scarlet fever; 5, smallpox; 6, measles; 7, whooping cough; 8, cerebrospinal meningitis; 9, leprosy; 10, poliomyelitis.	Physicians....................	1, secretary of local board of health in incorporated cities and towns; 2, secretary State board of health if outside of an incorporated city or town.	Within 24 hours..........	
			Secretaries of local boards of health.	Secretary State board of health.	Not later than 5th day of each month for the preceding month.	
		Ophthalmia neonatorum......	Nurses, midwives, or persons in charge.	Local board of health.......	At once....................	This applies only to towns and cities having over 1,000 inhabitants.
43	South Dakota.....	1, smallpox; 2, scarlet fever; 3, diphtheria; 4, measles; 5, cholera; 6, or any other disease dangerous to the public health.	Physician......................	Superintendent of county board of health.	Immediately..............	
		Poliomyelitis..................	Physician or head of family...	County board of health.....	Immediately..............	
		1, smallpox; 2, scarlet fever; 3, diphtheria; 4, cholera; 5, or any other disease dangerous to the public health.	Householder to report cases in his family or in persons temporarily residing with him.	Health officer having jurisdiction.	Immediately..............	
		Contagious and infectious diseases.	City and town health officers..	County superintendent of health.	Monthly..................	
		Contagious or infectious diseases.	Superintendents of county boards of health.	Superintendent of State board of health.	Immediately..............	
44	Tennessee.........	1, smallpox; 2, yellow fever; 3, cholera; 4, plague; 5, typhus fever; 6, diphtheria; 7, membranous croup; 8, scarlet fever; 9, or other communicable disease (except venereal disease); 10, poliomyelitis.	1, head of the household or other person in the household; 2, physicians.	Municipal or county health authorities.	Immediately..............	

		Ophthalmia neonatorum	Midwife, nurse, or other person having care of infant.	Health officer or physician	Immediately	
		1, smallpox; 2, cholera; 3, yellow fever; 4, scarlet fever; 5, diphtheria; 6, or other disease dangerous to the public health.	Municipal and county boards of health.	State board of health	Immediately	
		All communicable diseases	Municipal and county boards of health.	State board of health	On the 1st of each month for the preceding calendar month.	
45	Texas	1, Asiatic cholera; 2, plague; 3, typhus fever; 4, yellow fever; 5. smallpox; 6, scarlet fever; 7, diphtheria; 8, cerebrospinal meningitis; 9, dengue; 10, typhoid fever; 11, epidemic dysentery; 12, trachoma; 13, tuberculosis; 14, anthrax.	Physicians	Local health authority	Immediately in writing or by telephone.	
			Hotel proprietors, keepers of boarding houses or inns, householders, and heads of families whenever notice has not been given by the physician in attendance.	Local health authority	Within 12 hours	
			City and county health authorities.	President State board of health.	By the 5th of each month for the preceding calendar month.	
		Disease pestilential in character.	Physicians	President State board of health.	By telegraph or telephone at State expense.	
		Ophthalmia neonatorum	Nurse, midwife, or other person not a legally qualified practitioner of medicine.	Local health authority, or in his absence to any reputable physician.	Within 12 hours	
46	Utah	1, scarlet fever; 2, diphtheria; 3, whooping cough; 4, smallpox; 5, typhoid fever; 6, measles; 7, tuberculosis; 8, cholera; 9. rubella; 10, chickenpox; 11, typhus fever; 12, plague; 13, cerebrospinal meningitis; 14, poliomyelitis; 15, leprosy; 16, pneumonia.	Physicians and other persons caring for the sick.	Local board of health	Immediately	

Notifiable diseases and the health authorities to and through which reported—Continued.

States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
46 Utah (cont'd)	Any contagious or infectious disease.	Physicians or other persons having knowledge of actual or suspected cases.	Local board of health	Immediately	
	Venereal diseases	Physicians and superintendents or managers of hospitals or public institutions.	Local board of health	Immediately	Name of person affected not to be included in the report.
	Ophthalmia neonatorum	Physicians and midwives	Local board of health	Within 6 hours	
		Local health officer	State board of health	Immediately by telephone or telegraph.	
	1, scarlet fever; 2, smallpox; 3, diphtheria; 4, membranous croup; 5, typhoid fever; 6, whooping cough; 7, measles; 8, chicken pox; 9, pneumonia; 10, tuberculosis.	Local boards of health or health officers.	State board of health	On or before the 5th day of each month for the preceding month.	
47 Vermont	Communicable diseases dangerous to the public health.	Physicians	Local health officer	Immediately	
	Infectious or contagious disease dangerous to the public health.	Head of family to report cases in his home.	Local health officer	Immediately	
	Tuberculosis	Physicians	Secretary State board of health.		
	Ophthalmia neonatorum.	Nurse, relative, or other person having charge of infant.	Local health officer	Within 6 hours in writing.	
	1, smallpox; 2, Asiatic cholera; 3, typhus fever; 4, yellow fever; 5, and contagious or infectious diseases dangerous to the public health.	Local health officer	Secretary of the State board of health.	Immediately	When a communicable disease prevails or becomes epidemic, the local health officer is to make weekly reports to the State board.

48	Virginia	1, smallpox; 2, Asiatic cholera; 3, plague; 4, diphtheria; 5 scarlet fever; 6, yellow fever.	Physician	Secretary of the local board of health.	Immediately	
		1, typhoid fever; 2, measles; 3, chicken pox; 4, tuberculosis; 5, hookworm disease.	Physician	Secretary of the local board of health.	Once each month	The State commissioner of health advised Oct. 31, 1911, that poliomyelitis had been made notifiable during the early part of 1911.
		Any infectious, contagious communicable, or dangerous disease.	Physician	Executive officer of the board of health of the county, town, or city.		
			Local health authorities of the cities, towns, and counties.	State board of health	Weekly	
		1, smallpox; 2, yellow fever; 3, cholera; 4, typhus fever; 5, plague.	Local health authorities of the cities, towns, and counties.	State board of health	Immediately	
49	Washington	1, anterior poliomyelitis; 2, Asiatic cholera; 3, beriberi; 4, chicken pox; 5, diphtheria (or membranous croup); 6, epidemic cerebrospinal meningitis; 7, favus; 8, leprosy; 9, measles; 10, pellagra; 11, plague; 12, scarlet fever; 13, smallpox; 14, trachoma; 15, tuberculosis (pulmonary and abdominal); 16, typhoid fever; 17, typhus fever; 18, uncinariasis; 19, whooping cough; 20, yellow fever; 21, so-called cedar, Cuban, dobe, Egyptian, Japanese, kangaroo, Manila, or Philippine itch.	Physicians	Local health officer	Within 24 hours	
			City health officers, except those of cities of the first class (cities having over 20,000 inhabitants).	Every new outbreak to the county health officer and to the State commissioner of health.	Immediately	
				County health officer	Weekly	
			1, county health officers; 2, health officer of cities of the first class.	State commissioner of health.	Monthly by the 5th day of the month for the preceding month.	
		1. Smallpox	Physicians, or in their absence heads of families or householders.	Local health officer	Immediately	
		Obscure, eruptive disease of the nature of which he is in doubt.	Physicians	Local health officer	Immediately	
		1. Acute disease accompanied by an eruption of the skin.	Householder	Local health officer or the family physician.	Immediately	

Notifiable diseases and the health authorities to and through which reported—Continued.

	States.	Notifiable diseases.	By whom reported.	To whom reported.	When reported.	Remarks.
49	Washington (con.).	1, Asiatic cholera; 2, chicken pox in adults; 3, diphtheria; 4, plague; 5, scarlet fever; 6, smallpox; 7, yellow fever; 8, typhus fever.	1, county health officer; 2, health officers of cities of the first class.	State commissioner of health.	1, first case immediately; 2, after investigation report fully regarding outbreak.	
50	West Virginia	1, cholera; 2, smallpox; 3, scarlet fever; 4, diphtheria; 5, tuberculosis; 6, and other endemic, epidemic, infectious, or contagious diseases.	Physicians (where there is a local board of health).		Promptly	
			City and county board of health.	State board of health	At least once in every 3 months.	
51	Wisconsin	1, Asiatic cholera; 2, yellow fever; 3, smallpox; 4, typhus fever; 5, leprosy; 6, plague; 7, diphtheria; 8, scarlet fever; 9, typhoid fever; 10, measles; 11, whooping cough; 12, cerebro-spinal meningitis; 13, poliomyelitis.	1, physicians; 2, in absence of an attending physician the report is to be made by the head of the family or the person in charge of the house or building.	Local board of health	Immediately	
			Local health officer	State board of health	To make report upon the appearance of any of the enumerated diseases.	
		1, chicken pox; 2, erysipelas	Physicians	Local board of health		
		Tuberculosis	Physicians or person or owner, or agent, manager, principal, or superintendent of every public or private institution, or dispensary, hotel, boarding or lodging house.	Local department of health (town, city, or village).	Within 1 week	
		Inflamed eyes of infants under 2 weeks of age.	Nurse, parents, or other attendant.	Local board of health	Within 6 hours	
52	Wyoming	Communicable diseases	1, physician; 2, householder to report cases in his family or household.	Local board of health or health officer.	Immediately	

	1, smallpox; 2, cholera; 3, scarlet fever; 4, diphtheria; 5, or contagious or infectious disease a menace to the public health.	Physician	1, secretary State board of health; 2, county health officer.	Immediately by telegram or telephone, or in the most expeditious manner, the telegram to be paid for by the State.	
	1, smallpox; 2, cholera; 3, typhoid fever; 4, scarlet fever; 5, diphtheria; 6, or other epidemic or contagious or infectious disease.	County health officer	Secretary of State board of health.	Immediately	
	Typhoid fever on premises from which milk is sold.	State health officer	State board of health	At once	

Provisions made for health authorities by State and Territorial laws and regulations.

	Name of State.	State organization.	Counties.	Townships.	Cities.	Remarks.
1	Alabama	The State medical association is the state board of health. It elects a State health officer.	The county medical society constitutes a board of health for the county and for all municipalities therein. It elects a health officer for the county.		Health officer elected by county board of health for each incorporated city and town.	
2	Alaska					
3	Arizona	Board of health and superintendent of public health.	Board of health and superintendent of public health with jurisdiction outside of cities possessing a board of health.		Board of health and health officer in incorporated cities.	
4	Arkansas	Board of health	The county judges may appoint boards of health for their respective counties.		In cities of the first and second class the city council may establish a board of health with jurisdiction extending 1 mile beyond the city limits.	
5	California	Board of health	In each county the board of supervisors appoints a health officer.		It is the duty of the board of trustees or council of every incorporated town and city to establish a board of health. Unincorporated towns having 500 or more inhabitants have health officers appointed by the county board of supervisors.	
6	Colorado	Board of health	The board of county commissioners constitutes a board of health with jurisdiction outside of municipalities. This board appoints a health officer.		The mayor and council or trustees of each incorporated city and town constitute a board of health for the city or town and appoint a health officer.	
7	Connecticut	Board of health	The judges of the superior court appoint an attorney at law to be health officer for each county. He is not a local health officer, how-	The county health officer appoints a health officer for each town (township), except in towns containing a municipality,	The mayor of every city and the warden of every borough appoints a health officer for the city or borough, except in cities the char-	

			ever, as each town (township) has a local health officer.	the limits of which are coterminus with the town limits. In towns containing a city or borough, the limits of which are not coterminus with those of the town, the town health officer has jurisdiction only outside of the limits of the city or borough.	ters of which make other provision for such appointment.	
8	Delaware	Board of health	The governor appoints 3 physicians in each county to be health officers of the county.	....	It is the duty of the common council in cities and of the commissioners in incorporated towns to appoint a board of health for the city or town.	
9	District of Columbia.	Health officer appointed by the District Commissioners.	....	....	....	
10	Florida	1, State board of health; 2, State health officer.	The State health officer had appointed 41 agents in 39 counties (June 12, 1911).	....	Charters granted to cities by the legislature usually make provision for city health officers.	
11	Georgia	State board of health	The authorities of each county are authorized to establish a board of health and appoint a health officer, the board to have jurisdiction outside of incorporated municipalities.	....	The council of each incorporated city and town is authorized to establish a board of health and appoint a health officer.	
12	Hawaii	Territorial board of health	....	....	....	Board may appoint agents in such localities as it may deem necessary.
13	Idaho	State board of health	Board of health	....	The county boards of health are to insist on the organization of municipal boards of health in the incorporated towns and villages.	

Provisions made for health authorities by State and Territorial laws and regulations—Continued.

	Name of State.	State organization.	Counties.	Townships.	Cities.	Remarks.
14	Illinois	State board of health	The board of county commissioners in counties not under township organization constitute a board of health, with jurisdiction outside the limits of incorporated municipalities and with power to appoint a health officer for the county.	In counties under township organization the supervisor, assessor, and town clerk of each township constitute a board of health for the township, with jurisdiction outside the limits of incorporated municipalities and with power to appoint a health officer.	The city council in cities and the president and board of trustees in villages have power to appoint a board of health for their respective cities and villages, except in cities incorporated under special acts making other provision.	The city councils and boards of trustees in cities and villages have jurisdiction extending for one-half mile beyond the city or village limits for the purpose of enforcing health and quarantine ordinances and regulations.
15	Indiana	1, State board of health; 2, State health commissioner.	County health commissioner		Board of health in all incorporated cities, except that in counties having a population of less than 30,000 the county health commissioner may by agreement act also as city health officer in lieu of a city board of health. In incorporated towns the board of town trustees appoints a health officer.	
16	Iowa	State board of health		The trustees of each township constitute a board of health.	The mayor and council of each municipality constitute a board of health. They appoint a health officer.	The State is divided into 8 health districts.
17	Kansas	State board of health	The county commissioners in each county constitute a county board of health and elect a health officer.			
18	Kentucky	State board of health	Board of health		Cities having a population of over 2,500 have a board of health and a health officer.	
19	Louisiana	State board of health	The police jury of each parish is required to appoint a parish board of health and health officer.		Board of health	

20	Maine	State board of health		Board of health in each organized town (township).	Board of health	
21	Maryland	State board of health	The board of county commissioners constitutes a local board of health in each county, with jurisdiction throughout the county, except in cities having charters inconsistent with such extension of jurisdiction. The county board appoints a county health officer.			
22	Massachusetts	State board of health		Board of health	Board of health unless other provision is made in the city charter.	The State is divided into 14 health districts, with a State inspector of health in each district.
23	Michigan	State board of health		The township board constitutes a board of health and appoints a health officer.	The mayor and aldermen of each incorporated city and the president and council or trustees of each incorporated village in which no board of health is organized under its charter constitute a board of health for the city or village.	
24	Minnesota	State board of health	Board of health, with jurisdiction over all unorganized towns.	Every township board of supervisors constitutes a board of health for the township and has jurisdiction outside of cities and villages provided with an organized board of health. The board appoints a health officer.	Villages may and cities must provide for the establishment of a board of health and the appointment of a health officer.	
25	Mississippi	1, State board of health; 2, the State medical association and all other societies and associations of the State in affiliation with the purposes of its organization are constituted the Mississippi Department of Public Health. Any licensed practitioner may, on application, become a member of the department.	1, The State board of health appoints a health officer in each county, except in interior counties not wanting a health officer; 2, it is the duty of the bureau of vital statistics of the State department to appoint a county board of health in each county.		Cities may establish a board of health.	

Provisions made for health authorities by State and Territorial laws and regulations—Continued.

	Name of States.	State organization.	Counties.	Townships.	Cities.	Remarks.
26	Missouri	State board of health	County board of health, with jurisdiction outside of incorporated cities and towns.		St. Louis: Board of health and health commissioner. Cities of first class—board of health and health department. (Cities of the first class are those having a population of from 75,000 to 150,000.)	
27	Montana	1, State board of health; 2, State health officer.	1, county board of health; 2, County health officer.		1, incorporated cities and towns have a board of health; 2, towns having less than 5,000 inhabitants may place themselves under the county board of health.	
28	Nebraska	State board of health	County board of health, with jurisdiction throughout the county, except in cities and villages having power to establish boards of health.		1, cities having a population of over 100,000 have a health commissioner; 2, other cities have power to create a board of health.	
29	Nevada	State board of health	County board of health, consisting of the county physician, sheriff, and the board of county commissioners.		In incorporated cities and towns the city council has power to create a board of health. The board of county commissioners has the power to establish and maintain a board of health in any town or city.	
30	New Hampshire	State board of health		Board of health	The city council constitutes a board of health in cities.	
31	New Jersey	State board of health		Board of health	Every city, borough, and town is required to have a board of health.	
32	New Mexico	Territorial board of health	County health officer		The mayor and council, trustees, or other governing bodies of incorporated cities and towns constitute a board of health.	

33	New York	State department of health, at the head of which is a commissioner of health.		Board of health and health officer, with jurisdiction outside the limits of incorporated cities and villages having organized boards of health.	1, cities of the first class (population over 175,000) have a commissioner of health; 2, cities of the second class (population between 50,000 and 175,000), the commissioner of public safety appoints a health officer; 3, cities of the third class (population less than 50,000), board of health and health officer; 4, villages have a board of health and a health officer.	
34	North Carolina	State board of health and State health officer.	1, board of health; 2, superintendent of health; 3, quarantine officer.	The county quarantine officer may appoint a deputy quarantine officer in each township.	City and town authorities may elect municipal health officers.	
35	North Dakota	State board of health	1, county superintendent of health; 2, county board of health with jurisdiction outside the limits of cities having a city board of health. The county board is under the supervisory control of the State board.	The supervisors of each township constitute a board of health.	1, board of health and health officer in each incorporated city; 2, the trustees of each incorporated village constitute a board of health for the village.	
36	Ohio	State board of health		The trustees of each township constitute a board of health with jurisdiction outside the limits of cities. They appoint a health officer.	1, cities have a board of health and health officer; 2, villages may have a board of health and health officer or only health officer.	
37	Oklahoma	State board of health "in charge of * * * the State commissioner of health."	The State commissioner of health appoints in each county, a county superintendent of public health.	The board of directors of each township constitute a board of health, under the supervision of the county superintendent of public health.	1, in incorporated towns the town board of directors constitutes a town board of health, under the supervision of the county superintendent; 2, in cities of the first class (over 2,000 population) the mayor and common council constitute a board of health and are authorized to appoint a city superintendent of public health.	

Provisions made for health authorities by State and Territorial laws and regulations—Continued.

	Name of State.	State organization.	Counties.	Townships.	Cities.	Remarks.
38	Oregon	State board of health and State health officer.	Board of health and health officer.		Board of health and health officer.	
39	Pennsylvania	Department of health consisting of a commissioner of health and an advisory board.	The State department of health has appointed a physician in each county to act as a representative of the department.	1, in townships of the first class (population of at least 300 to the square mile) the township commissioners appoint a board of health which elects a health officer; 2, in townships in which there is no organized board of health the State department appoints a local health officer and pays his salary.	1, cities of the first class (population over 1,000,000) have a board of health, the executive officer of which is the director of public health and charities; 2, cities of the second class (population 100,000 to 1,000,000) have a bureau of health under the control of the department of public safety; 3, cities of the third class (population under 100,000) may by ordinance create a board of health; 4, boroughs (incorporated villages with over 300 inhabitants) have a board of health.	The commissioner of health is authorized to apportion the State into 10 districts and to appoint a physician in each district to be health officer and to appoint such assistants to the district health officers as may be necessary.
40	Porto Rico	1, director of health, charities, and corrections; 2, insular board of health; 3, director of sanitation.				The island is divided into four sanitary districts with an inspector in charge of each. Each sanitary district is divided into sanitary zones. Each zone has a board of health and is in charge of a health officer.
41	Rhode Island	State board of health and commissioner of public health.		In each town (township) the town council or board of aldermen constitutes a board of health and appoints a health officer.	City councils may appoint boards of health.	
42	South Carolina	1, State board of health, consisting of the State medical association and the attorney and comptroller generals; 2, executive committee recommended by State medical			It is the duty of the mayor or intendent of every incorporated city, town, or village to appoint a board of health. The board of health elects a health officer. It is	The executive committee is authorized to divide the State into health districts, and in districts in which there are no boards of health to ap-

		association and appointed by the governor; 3, State health officer appointed by the governor.			the duty of the State board to appoint boards of health in all unincorporated towns and villages with a population of more than 100.	point subboards of health.
43	South Dakota	State board of health	Board of health consisting of the State's attorney of the county and 2 physicians appointed by the State board of health, one of whom is superintendent of the county board and the other vice president.	....	City councils have the power to appoint boards of health for their respective cities.	
44	Tennessee	State board of health	The county judge, court clerk, and health officer or jail physician constitute a county board of health. It is the duty of the county court in counties having jails to appoint a jail physician or health officer.	....	Municipalities having 5,000 or more inhabitants are required to organize boards of health.	Boards of health of cities and towns have jurisdiction extending to 1 mile beyond the corporation limits.
45	Texas	State board of health and State health officer. The latter is president and executive officer of the board.	County health officer appointed by the commissioner's court.	....	It is the duty of the authorities of each incorporated city and town to elect a city health officer.	
46	Utah	State board of health	The county outside of incorporated municipalities is divided into sanitary districts with a health officer in each. The district health officers, together with the county commissioners constitute a county board of health.	....	It is the duty of the city authorities of every incorporated city and town to establish a board of health.	
47	Vermont	State board of health	....	The State board of health appoints a health officer for each town (township). The health officer with the selectmen of the town or board of aldermen of the city constitutes a local board of health.	Board of aldermen and health officer constitute board of health.	

Provisions made for health authorities by State and Territorial laws and regulations—Continued.

	Name of State.	State organization.	Counties.	Townships.	Cities.	Remarks
48	Virginia..........	1, State board of health; 2, health commissioner.	The State board of health appoints 3 physicians in each county, who with the chairman of the board of supervisors constitute a county board of health.	....	The State board of health appoints 3 physicians in each incorporated city and town who with the mayor constitute a city or town board of health (except in cities having charters providing for the creation of a board of health). Each board elects one of its medical members health officer.	
49	Washington.......	1, State board of health; 2, State commissioner of health.	The board of county commissioners constitutes a county board of health and appoints a health officer. The board has jurisdiction outside of cities of the first class (cities having over 20,000 inhabitants).	....	Health officers in all incorporated cities and towns.	
50	West Virginia.....	State board of health..........	1, county board of health (of which 3 of the 5 members are appointed by the State board of health); 2, county health officer with jurisdiction outside of incorporated cities and towns.	....	Incorporated cities, towns, and villages have boards of health and health officers independent of the county board and auxiliary to the State board. Of the above local boards of health the State board appoints 3 of the 5 members.	
51	Wisconsin........	State board of health..........	....	The town (township) board constitutes a board of health and elects a health officer.	The village board or common council constitute a board of health in cities and villages and appoint a health officer.	
52	Wyoming.........	State board of health..........	The State board of health appoints a physician in each county to be county health officer.	....	....	

APPENDIX.

STATE AND TERRITORIAL LAWS WHICH REQUIRE THE REPORTING OF CASES OF SICKNESS.

Compiled in the bureau from the statutes of the several States and Territories, as found in the Law Library of Congress, and from copies of recent laws transmitted by special request by the respective State health authorities.

ALABAMA.

[Code of 1907.]

SEC. 703. It shall be the duty of county boards of health:

(*a*) To * * * enforce the law for the collection of vital and mortuary statistics.

* * * * * * *

SEC. 706. It shall be the duty of the health officer of a county:

(*a*) To keep * * * also, a book to be styled "The Register of Infectious Diseases," in which book he shall register, so far as reported to him, the name, age, sex, color, race, occupation, and place of residence, together with such other details as may be required by said regulations, of all persons who may be attacked by any of the diseases enumerated in section seven hundred and sixteen of this code; * * *.

* * * * * * *

(*h*) To make to the State health officer prompt report of the presence in the county, so far as reported to him, or has come to his knowledge, of any of the diseases enumerated in section seven hundred and sixteen of this code, furnishing such information and at such intervals as the State health officer may require.

* * * * * * *

SEC. 710. It shall be the duty of the health officer of a municipality:

(*a*) To keep, under regulations prescribed by the State board of health * * * a book to be styled "The Register of Infectious Diseases," in which he shall register, so far as reported to him, the name, age, sex, color, race, occupation, and place of residence, together with such other details as may be required by said regulations, of all persons who may be attacked by any of the diseases enumerated in section seven hundred and sixteen of this code; * * *.

* * * * * * *

(*g*) To make to the mayor and council of the municipality, to the committee of public health of the county board of health, and to the State health officer prompt reports of the presence in the municipality of any of the diseases enumerated in section seven hundred and sixteen of this code, furnishing such information and at such intervals as said authorities may require; * * *.

* * * * * * *

SEC. 714. Every physician who is called to a case of any of the diseases named in section seven hundred and sixteen of the code shall, as soon thereafter as can be done, make a report thereof to the county, city, or town health officer in whose jurisdiction the case is located, specifying the name of the patient, the locality of the patient, the character of the disease, together with such other details as will furnish adequate information of the conditions and surroundings.

Sec. 715. Whenever a disease appears in a county, incorporated city, or town, suspected by any physician, or midwife, or by any person on whose premises such sick person is, of being one of those enumerated in the next succeeding section, such physician, or midwife, or such person, shall report his or her suspician to the health officer having jurisdiction over the locality where such case appears, * * *.

Sec. 716. Should the disease prove to be leprosy, cholera, typhus fever, cerebrospinal meningitis, or spotted fever, yellow fever, scarlet fever, bubonic plague, hydrophobia, glanders, smallpox, diphtheria, pulmonary tuberculosis, typhoid fever, Chagres fever, beriberi, or of other nature believed to be grave and at the same time contagious, infectious, or pestilential in character, or if the disease be known to be either one of those just enumerated and be so reported, the health officer of the county, city, or town shall promptly notify in writing the probate judge and commissioners or board of revenue of the county, the mayor or intendant, and the council of the city or town, according to the location of the disease, of the presence and extent of prevalence of the disease, * * *.

* * * * * * *

Sec. 7049 (as amended by ch. 446, Acts of 1911). Any head of a family, or other person, upon whose premises a case of infectious or pestilential disease occurs, which is not under the charge of a physician, who refuses or willfully fails to report the same as promptly as can be done, to the health officer, county or municipal, in whose jurisdiction the case is must, on conviction, be fined not less than five nor more than twenty-five dollars.

* * * * * * *

Sec. 7052. (as amended by ch. 446, Acts of 1911.) Any physician being called upon to treat a case of infectious or pestilential disease or to whose knowledge the existence of such case comes, who refuses or willfully fails to make to the health officer, county or municipal, in whose jurisdiction the case is located, a full and prompt report thereof, specifying the character of the disease, the name and locality of the patient, together with such other details as may be required by the state board of health, must, on conviction, be fined not less than ten nor more than fifty dollars.

ARIZONA.

[Acts of 1903, ch. 65.]

Sec. 7. * * * The county superintendent of health shall keep a record of all the proceedings of the board and of his official acts, and he shall, at the end of every month, make a full report in writing to the superintendent of public health of the proceedings of the county board of health and of his official acts, and shall, whenever the health of persons is in danger, and when any contagious and infectious disease occurs in his county among persons, immediately report the same to the superintendent of public health.

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Sec. 24. Whenever it shall come to the knowledge of any physician or other person that a contagious, epidemic, or infectious disease exists within the jurisdiction of any local board he shall immediately report to such board in writing the name and place of residence, if known, of every person afflicted with such disease, and if he is the attending physician of such person he shall report not less than twice in each week the condition of each person so afflicted and the state of such disease.

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Sec. 26. Each keeper of any private house, boarding house, lodging house, inn or hotel shall report, in writing, to the local board of health within whose jurisdiction the same may occur, each case of contagious, infectious, or epidemic disease which may occur in his house, inn, or hotel. Such report shall be made within twenty-four hours after the existence of such disease shall have become known to such person and shall state the name of each person afflicted with such disease and the nature thereof.

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SEC. 31. It shall be the duty of each local board of health when it shall come to its knowledge that a case of smallpox, scarlet fever, diphtheria, or other infectious or contagious disease exists within its jurisdiction immediately to examine into the facts of the case * * * and shall immediately notify the Territorial board of health of the existence and nature of such disease and of the measures adopted by it with reference thereto.

ARKANSAS.

[Digest of Statutes, 1904. (Kirby.)]

SEC. 540. It shall be the duty of the State board of health to have general supervision of the State system of * * * the registration of prevalent diseases, said board shall prepare the necessary methods and forms for obtaining and preserving such records and to insure the faithful registration of the same in the several counties. * * * The secretary of said State board of health shall be the superintendent of registration of vital statistics of the State. * * *

CALIFORNIA.

[Political Code, 1909. (Deering.)]

SEC. 2979a (as amended by sec. 1, ch. 250, Laws of 1911). It is the duty of each coroner and of every county, city and county, city or town health officer, and every member of the local board of health knowing or having reason to believe that any case of cholera, plague, yellow fever, leprosy, diphtheria, scarlet fever, smallpox, typhus fever, typhoid fever, anthrax, glanders, epidemic cerebro-spinal meningitis, tuberculosis, pneumonia, dysentery, erysipelas, uncinariasis or hookworm, trachoma, dengue, tetanus, measles, German measles, chickenpox, whooping cough, mumps, pellagra, beriberi, syphilis, gonococcus infection, rabies, poliomyelitis, or any other contagious or infectious disease exists, or has recently existed, within the city, county, city and county, town or township of which he is such officer, * * * to report at once in writing such cases to the secretary of the State board of health at Sacramento.

It is also the duty of every attending or consulting physician, nurse, or other person having charge of or caring for any person afflicted with any of said contagious diseases to report at once in writing to the local board of health or local health officer the nature of the disease, the name of the person afflicted, and the place of his or her confinement; provided, however, that syphilis and gonococcus infection shall be reported by office number only.

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SEC. 2984. * * * It shall be the duty of such board of health or chief executive health officer to report in writing to the State board of health on or before the fifth day of each month all infectious, contagious, and communicable diseases in man or beast which shall come to their or his knowledge upon blanks furnished by the State board of health. Said board of health or chief executive health officer, where there is no board of health, in cases of local epidemic of disease shall report to the State board of health all facts concerning the disease. * * *

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SEC. 3061. * * * Every local board of health established in this State must:

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Second. Report to the secretary of the State board of health, at Sacramento, at such times as the State board of health may require:

* * * * * * *

(c) The presence of epidemic or other dangerous, contagious, or infectious disease. * * *

[Acts of 1907, ch. 492.]

SEC. 11. It shall be the duty of every county, city and county, municipal, town, or other health officer or inspector to enforce diligently within the county, city and county municipality, town or district of which he is such health officer all State laws pertaining to health and sanitary matters; and all orders, rules, and regulations concerning health, * * * prescribed or directed by the State board of health, and all local ordinances, resolutions, orders, and regulations concerning health of the board of supervisors, which shall not be in conflict with the general laws or the orders, rules, and regulations of the State board of health.

Said health officers shall report to the State board of health all violations of the State health laws and all violations of the State laws relating to registration of births, marriages, and deaths which shall come to their knowledge.

Every county health officer and every city and county, city, or town board of health, or chief executive health officer thereof, shall report in writing to the State board of health regularly on or before the fifth day of each month, and also whenever requested by the State board of health or its secretary, all infectious, contagious, and communicable diseases in man or beast which shall come to his knowledge upon blanks furnished by the State board of health; and he shall, in cases of local epidemic of disease, report at such times as shall be requested by the State board of health, or its secretary, all facts concerning the disease. * * *

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Sec. 13 (as amended by sec. 3, ch. 339, Laws of 1911). The following rules and requirements shall be strictly observed in all cases of quarantine, subject, however, to such changes and modifications as the State board of health or its secretary may otherwise require and direct.

Rule 1.— * * * Said health boards or officers must, within twenty-four hours after quarantine, report fully, in writing, to the secretary of the State board of health all of such cases quarantined: *Provided, however*, That said health officers shall immediately report by telegraph to said secretary of the State board of health every case discovered or known of plague, Asiatic cholera, yellow fever, or typhus fever, and after investigation and within twenty-four hours shall report the cause, source, and extent of contagion and infection, and all acts done and measures adopted in each case, and shall make such further reports as the secretary of the State board of health may require.

Rule 2.—In addition to the list of quarantinable diseases given in rule 1 of this section the following is a partial list of contagious, infectious, and communicable diseases, all of which, though not required to be quarantined, must be promptly reported in writing to the State board of health or its secretary by the said local health boards or chief executive health officers, viz: Chicken-pox, erysipelas, pneumonia, uncinariasis or hookworm, epidemic cerebro-spinal meningitis, trachoma, whooping-cough, mumps, dengue, dysentery, tuberculosis, typhoid fever, tetanus, malaria, leprosy, measles, German measles, glanders, and anthrax affecting human beings, rabies, pellagra, beriberi, syphilis, gonococcus infection, and poliomyelitis, and any disease which appears to have become epidemic. * * * This list can be changed at any time by the State board of health or its secretary.

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Sec. 16. All physicians, nurses, clergymen, attendants, owners, proprietors, managers, employees, and persons living in or visiting any sick person in any hotel, lodging house, house, building, office, structure, or other place where any person shall be ill of any infectious, contagious, or communicable disease, shall promptly report such fact to the county, city and county, city, or other local health board or health officer, together with the name of the person, if known, and place where such person is confined and nature of the disease, if known.

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Sec. 21 (as amended by sec. 4, ch. 339, Laws of 1911). Any person violating any of the provisions of this act, whether acting for himself or as the agent or servant of another person, or of a firm, company, or corporation, or as an officer, agent, employee, or representative of any municipal corporation, or of the State shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than twenty-five nor more than five hundred dollars, or by imprisonment for a term of not more than ninety days, or by both such fine and imprisonment. Each day that in violation of any provision of this act shall continue, and each day that any thing forbidden by the terms hereof to be erected, constructed, maintained, operated, or permitted, shall continue to exist, or be maintained, operated, or permitted, shall constitute a separate offense.

[Acts of 1911, Ch. 485.]

SECTION 1. Every medical practitioner attending on or called in to visit a patient whom he believes to be suffering from lead, phosphorus, arsenic or mercury or their compounds, or from anthrax, or from compressed air illness, contracted as a result of the nature of the patient's employment shall send to the State board of health a notice stating the name and full postal address and place of employment of the patient and the disease from which, in the opinion of the medical practitioner, the patient is suffering, and shall be entitled in respect of every bona fide notice sent in pursuance of this section to a fee of fifty cents, to be paid as part of the expense incurred by the State board of health in the execution of this act.

SEC. 2. If any medical practitioner, when required by this act to send a notice, wilfully fails forthwith to send the same, as provided by this act, he shall be guilty of a misdemeanor, and upon conviction of the same shall be fined not more than ten dollars.

SEC. 3. It shall be the duty of the State board of health to enforce the provisions of this act, and it may call upon local boards of health and health officers for assistance and it shall be the duty of all boards and officers so called upon for such assistance to render the same. It shall furthermore be the duty of said State board of health to transmit such data to the commissioner of the bureau of labor statistics.

COLORADO.

[Revised Statutes, 1908.]

SEC. 5025. If a conductor of any railroad discovers on his train a person suffering from cholera, smallpox, diphtheria, scarlet fever, or any other contagious disease, he shall at once communicate, either by telegraph or telephone, with a local railroad official located nearest the point at which the case is discovered, giving the number of his train, the number of the car, the name of the patient, and the nature of the disease suspected. The railroad official so informed must at once give the same intelligence to the nearest member of the State board of health or to the local health officer of his own town or city.

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SEC. 5070. Whenever any householder shall know that any person within his family is taken sick with smallpox or any other disease dangerous to the public health, he shall immediately give notice thereof to the board of health or health officer of the town, city, or county in which he resides; and if he shall refuse or neglect to give such notice he shall upon conviction be fined in a sum not exceeding one hundred dollars.

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SEC. 5072. Whenever any physician shall know that any person whom he is called to visit, or who is brought to him for examination, is infected with smallpox, cholera, diphtheria, scarlet fever, or any other disease dangerous to public health, he shall immediately give notice thereof to the health officer, the president or the clerk of the board of health of the county, town, or village in which the sick person may be, and to the householder, hotel keeper, keeper of a boarding house, or tenant within whose house or rooms the sick person may be. The notice to the officer of the board of health shall state the name of the disease, the name, age, and sex of the person sick, also the name of the physician giving the notice, and shall, by street and number or otherwise, sufficiently designate the house or room in which said sick person may be; and every physician, and person acting as a physician, who shall refuse or neglect immediately to give such notice, shall for each offense, upon conviction, be fined in a sum not less than five nor more than one hundred dollars: *Provided*, That this penalty shall not be enforced against a physician if another physician in attendance has given to the health officer hereinbefore mentioned an immediate notice of such sick person, and the true name of the disease, in accordance with the requirements of this section.

Sec. 5073. Whenever the health officer of any county, city, or village in this State shall receive reliable notice, or shall otherwise have good reason to believe that there is within the county, city, or village of which he is the health officer, a case of smallpox, diphtheria, scarlet fever, or other communicable disease dangerous to the public health, it shall be the duty of the health officer, unless he is or shall have been instructed by the board of health, of which he is an executive officer, to do otherwise; * * * to promptly notify teachers or superintendents of schools concerning families in which are contagious diseases; * * * to keep the president of his own board of health and the secretary of the State board of health constantly informed respecting every outbreak of a disease dangerous to the public health, and of the facts, so far as the same shall come to his knowledge, respecting sources of danger of any such diseased person or infected article being brought into or taken out of the county, city, or village of which he is the health officer.

CONNECTICUT.

[General Statutes, 1902.]

Sec. 2508. When in any town, city, or borough, a case of smallpox, cholera, or any epidemic of infectious disease is known to exist, the local health officer of such town, city, or borough shall immediately notify the secretary of the State board of health of the existence of the same, with such facts as to its cause and continuance as may be known. Every person violating this section shall be fined not more than twenty-five dollars.

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Sec. 2532. * * * The health officer of every town, city, and borough shall, on or before the eighth day of each month, make a report to the State board of health of all contagious diseases reported to him during the month preceding.

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Sec. 2534. Every physician shall report in writing every case of cholera, yellow fever, typhus fever, leprosy, smallpox, diphtheria, membranous croup, typhoid fever, scarlet fever, or other contagious or infectious disease, except those of a venereal nature, occurring in his practice, to the health officer of the town, city, or borough in which such case occurs, within twelve hours after his recognition of the disease. Every person who shall violate any provision of this section shall be fined not more than twenty-five dollars.

Sec. 2535. Should one or both eyes of an infant become inflamed or swollen, or reddened at any time within two weeks after its birth, the midwife, nurse, or attendant having charge of such infant, shall report in writing, within six hours, to the health officer or board of health of the city, town, or borough in which the parents of the infant reside, the fact that such inflammation, swelling, or redness of the eyes exists. Every person violating the provisions of this section shall be fined not more than two hundred dollars.

Sec. 2546. Every hotel or lodging-house keeper, in whose house any lodger becomes sick of any malignant or contagious disease, shall within twelve hours after such lodger becomes sick report in writing to the board of health or health officer the name of such person if known and the nature of his disease.

[Acts of 1907, ch. 170.]

Sec. 1. The health officer or board of health of any town, city, or borough shall, within twenty-four hours after having received information of the existence or supposed existence within such town, city, or borough of the infectious disease known as rabies, give notice thereof to the commissioner on domestic animals. * * *

[Acts of 1909, ch. 79.]

Sec. 1. Tuberculosis is hereby declared to be an infectious and communicable disease dangerous to the public health. It shall be the duty of every physician to report in writing the name, age, sex, color, occupation, place where last employed, if known, and address of every person under his care known by such physician to have tuberculosis, to the health officer of the city, town, or borough in which such person resides, within twenty-four hours after such fact comes to the knowledge of such physician, and it shall be the duty of the officer in charge of any hospital, dispensary, asylum, or other similar institution to report in like manner concerning every patient having tuberculosis who comes under care or observatiom of such officer, within twenty-four hours thereafter.

DELAWARE.

[Acts of 1899, ch. 240.]

Sec. 4. All physicians, dentists, veterinary surgeons, or others practicing medicine or surgery or any branch thereof under the laws of this State shall be required to give prompt notice to the local or State board of health of any and all cases of contagious or infectious diseases that may come under their professional notice. * * *

[Acts of 1893, ch. 642.]

Sec. 11. (Added by sec. 6, ch. 327, Acts of 1903.) It shall be the duty of the boards of health authorities, and of physicians in rural districts or other localities where there are no health officials. to report to the board of health of the State of Delaware the existence of any case of contagious or infectious diseases which may come under their observation. * * *

[Acts of 1879–81, ch. 345.]

Sec. 17. (Added by sec. 3, ch. 328, Acts of 1903.) Every physician or other person having knowledge of any person who is suffering any disease dangerous to the public health, which the State board of health may require to be reported, shall report the same to the health board or official nearest his place of residence, giving the name, age, sex, and color of the patient and the house or place where he or she may be found. * * *

DISTRICT OF COLUMBIA.

[29 Stat. L., p. 635.]

For the purposes of this act the term "contagious disease" shall be held to mean Asiatic cholera, yellow fever, typhus fever, smallpox (including varioloid), leprosy, the plague, and glanders, or any of these diseases by whatever name it may be designated; the term "case of contagious disease" shall be held to mean any person suffering from any such disease. Any person shall be held to be suffering from a contagious disease who is so infected by such disease as to be capable of transmitting it to others. The presence of the ordinary clinical symptoms of any contagious disease shall be prima facie evidence that such case is or was such a disease; and the presence in such case of the specific bacteria of such disease shall be conclusive evidence that such case is or was such disease. The provisions of this act shall apply to every ship, vessel, steamer, boat, or craft lying or being in the rivers, harbors, or other waters within the jurisdiction of said District, and to every tent, van, hovel, barn, outhouse, cabin, or other place in said District. The term "person in charge of a case of contagious disease" shall be held to mean, first, the head of the family in which such case belongs; second, in his absence or disability or in case he be the person sick, the nearest relative or relatives of such case present on the premises where such case is, and being in attendance on him; third, in the absence of such relatives everyone in attendance on such person; fourth, in the absence of anyone so in attendance, everyone in charge of the premises where such person is.

Sec. 2. Every physician attending on or called in to visit, or examining any case of contagious disease in the District of Columbia, shall * * * at once send to the health officer of said District a certificate signed by him, which said certificate shall state the name of the disease and the name, age, sex, and color of the person suffering therefrom and shall set forth by street and number, or otherwise sufficiently designate the house, room, or other place in which said person may be located, together with such other reasonable information relating thereto as may be required by said health officer. * * *

* * * * * * *

Sec. 4. Whenever any person in said District is suffering from any contagious disease, or suspected of being suffering from such disease, and no physician is in attendance on or called in to visit, or examine such person, it shall be the duty of the person in charge of such case * * * to send to said health officer certificates relative thereto, in the same manner as is required by this act of physicians attending on or called in to visit, or examining like cases.

[34 Stat. L., p. 889.]

Every person in charge of any patient in the District of Columbia who is suffering from diphtheria, scarlet fever, measles, whooping cough, chicken pox, epidemic cerebro-spinal meningitis, or typhoid fever, immediately after becoming aware of the existence of such disease, shall send to the health officer of said District a certificate written in ink, signed by such person, stating the name of the disease, the name, age, sex, and color of the person suffering therefrom, and the school, which he or she has attended, if any, and setting forth by street and number, or by other sufficient designation, the location of the house, room, or other place in which said patient can be found. When said patient recovers, or dies, said person in charge, as soon as possible thereafter, shall send to the health officer of said District a certificate, written in ink, certifying to that fact. But no person shall certify knowingly or negligently that any person has recovered from any disease aforesaid until such patient is in such condition as to be free from danger of communicating the disease from which he is suffering to other persons.

Sec. 2. The term "person in charge of any patient," as used in this act, shall be held to mean, first, each physician in attendance on, called in to visit, or examining a patient, unless called in to visit or examining the patient solely as a consultant to a physician already in attendance; second, in the absence or disability of any physician aforesaid, or in event of default on the part of such physician, the head of the family to which the patient belongs; third, in the absence or disability of such person, or in event of default on the part of the physician aforesaid, the nearest relative or relatives of such patient present on the premises and in attendance on such patient; fourth, in the absence or disability of all persons aforesaid, or in event of default on the part of the physician aforesaid, every person in attendance on such patient. And in the cases of physicians and of persons acting in the capacity of physicians, attending, visiting, or examining any patient suffering from any disease aforesaid, shall be prima facie evidence that any person so doing was aware of the nature of such disease.

[35 Stat. L., p. 126.]

It shall be the duty of every physician in the District of Columbia to report in writing to the health officer of said District, within one week after the disease is recognized, on forms to be provided by said health officer, the name, age, sex, color, occupation, and address of every person under his care in said District, who, in his opinion, is afflicted with pulmonary or other communicable form of tuberculosis. It shall also be the duty of the officer having charge for the time being of each and every hospital, dispensary, asylum, or other similar public or private institution in said District to report in like manner the name, age, sex, color, occupation, and last address of every person who is in his care or who has come under his observation within one week of such time who, in his opinion, is afflicted with pulmonary or other communicable form of tuberculosis.

FLORIDA.

[General Statutes, 1906.]

Sec. 1114. It shall be the duty of every practicing or licensed physician in the State of Florida to report immediately to the president of the board of health, by telegram or in the most expeditions manner, every case of yellow fever, smallpox, or cholera that comes within his practice, such telegram to be paid for out of the funds provided for the expenses of said board of health.

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Sec. 1146. Whenever a physician or other person shall report a suspicious case of disease to the State board of health as required by the provisions of section 3619 of the General Statutes of Florida, he shall also immediately give notice thereof to the city health officer, if there be any health officer, and if not to the mayor of the incorporated city or town in which the sick person may be; or if the sick person resides or be found outside of the limits of a city or town, to the county health physician or his representative, if there be any, and if not, to the chairman of the county commissioners of the county within which the sick person may be.

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Sec. 3619. Whoever, being a licensed or practicing physician, fails to report immediately to the president of the State board of health by telegram (to be paid for out of the funds to be provided for the expenses of the said board of health), or in the most expeditious manner, every case of yellow fever, smallpox, or cholera that comes within his practice, shall be punished by imprisonment not exceeding six months, or by fine not exceeding one thousand dollars.

Sec. 3620. Any physician, city health officer, mayor, county health physician, or chairman of the board of county commissioners, who shall neglect or fail to comply with the provisions of sections eleven hundred and forty-six to eleven hundred and forty-eight, shall, upon conviction, be liable to a fine of one hundred dollars or imprisonment for thirty days.

GEORGIA.

[Penal Code of 1895.]

Sec. 499. Any physician or other person who shall conceal a case of smallpox, or varioloid, or any modification of the same, within any incorporated city, town, or in any county, by not giving immediate notice thereof to the mayor, intendant, or health officer, or ordinary, shall be punished as for a disdemeanor.

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[Political Code of 1895.]

Sec. 1468. Any physician or other person who shall conceal a case of smallpox, or varioloid, or any modification of the same, within any incorporated city, town, or in any county in this State, by not giving immediate notice thereof to the mayor, intendant, or health officer, or ordinary, may be indicted.

[Acts of 1903, ch. 453.]

SEC. 5. It shall be the duty of the local boards of health and of physicians in localities where there are no health authorities, to report to the State board of health promptly upon the discovery thereof, the existence of any of the following diseases, to wit: Asiatic cholera, yellow fever, scarlet fever, smallpox, diphtheria, typhus or typhoid fever, and of such other contagious or infectious diseases as the State board of health from time to time may specify. * * *

HAWAII.

[Revised Laws, 1905.]

SEC. 988. * * * Said board (Territorial board of health) shall also, during the prevalence of any severe pestilence, or epidemic, publish a weekly report of the public health.

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SEC. 1004. (As amended by Laws of 1911, act 125, sec. 1.) Physicians to report. It shall be the duty of every physician having a patient infected with cerebro-spinal meningitis, cholera asiatic, conjunctivitis follicular, diphtheria, dysentery amœbic, enteric (or typhoid) fever, fever para-typhoid, leprosy, measles, dengue, paralysis infantile, pertussis, plague, scarlet fever (or scarlatina), tetanus, trachoma, tuberculosis, typhus fever, varicella, variola, varioloid, yellow fever, or any other infectious or communicable or other disease dangerous to the public health to give immediate notice thereof to the board of health or its nearest agent, in writing, and in like manner to report to said board or its agent every case of death which takes place in his practice from any such disease; provided, however, that whenever a physician has a patient infected with variola, varioloid, scarlet fever, diphtheria, plague, cholera, yellow fever, typhus fever, cerebro-spinal meningitis or amœbic dysentery, such physician, in addition to the notice in writing required to be given as above, shall immediately notify the board of health or its nearest agent either by telephone or by direct oral communication. Every physician who shall refuse or neglect to give such notice or to make such report shall be fined for each offense a sum not less than ten nor more than one hundred dollars.

SEC. 1005. (As amended by Laws of 1911, act 125, sec. 2.) Others to report. It shall be the duty of every householder, keeper of a boarding or lodging house, or master of a vessel to report immediately to the board of health or its nearest agent any person in or about his house or vessel whom they shall have reason to believe to be sick or to have died of any infectious, communicable, or other diseases dangerous to the public health; and all police officers who are aware of any person suffering from any infectious, communicable, or other disease dangerous to the public health shall immediately report the same to the board of health or its nearest agent. Any such householder, keeper of a boarding or lodging house, master of a vessel, or police officer who shall refuse or neglect to so report immediately to the board of health or its nearest agent shall be guilty of a misdemeanor and upon conviction shall be fined not more than one hundred dollars for each offense.

SEC. 1005A. (Added by Laws of 1911, act 125, sec. 3.) Diseases declared infectious and communicable: Cerebro-spinal meningitis, cholera asiatic, conjunctivitis follicular, diphtheria, dysentery amœbic, enteric (or typhoid) fever, fever paratyphoid, leprosy, measles, dengue, paralysis infantile, pertussis, plague, scarlet fever (or scarlatina), tetanus, trachoma, tuberculosis, typhus fever, varicella, variola, varioloid, yellow fever are hereby declared to be infectious and communicable diseases dangerous to the public health, but this enumeration shall not be held to exclude any other disease that is infectious, communicable, or dangerous to the public health, though not specifically named herein.

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SEC. 1124. It shall be the duty of every police officer or deputy sheriff having reason to believe that any person within his district is afflicted with leprosy, to report the same forthwith to the agent of the board of health in such district, if any, otherwise, to the nearest agent of the board of health.

SEC. 1125. Any police officer or deputy sheriff who shall wilfully fail to comply with the provisions of section eleven hundred and twenty-four shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined in a sum not less than ten dollars, nor more than two hundred dollars, and shall be dismissed from office.

[Laws of 1909, Act 81.]

SEC. 3. Every person who knows, or has reason to believe, that he, or any other person, not already under the care or control of the board of health, is a leper, shall, forthwith report to the board (of health) or its authorized agent, that fact and such other information relating thereto as he may have and the board may require.

[Laws of 1911, Act 118.]

SEC. 7. Reports by physicians and others. It shall be the duty of every physician in the Territory to report in writing the name, age, sex, nationality, occupation, place where last employed, if known, and address of every person known by said physician to have tuberculosis to the board of health or its nearest agent within twenty-four hours after such fact comes to the knowledge of said physician. It shall also be the duty of the superintendent in charge of any hospital, dispensary, asylum, or other similar private or public institution, to report in like manner the name, age, sex, nationality, occupation, place where last employed, if known, and previous address of every patient having tuberculosis who comes into his care or under his observation within twenty-four hours thereafter.

* * * * * * *

SEC. 15. Reporting recovery of patient. Upon the recovery of any person having tuberculosis it shall be the duty of the attending physician to make a report of this fact to the board of health or its agent, who shall record the same, and shall relieve said person from further liability to any requirement imposed by this act.

IDAHO.

[Revised Codes, 1908.]

SEC. 663. The owner, or agent of the owner, of a house in which a person resides who has the smallpox, diphtheria, scarlet fever, or any other contagious or infectious disease, dangerous to the public health, and the physician called to attend the person or persons so affected shall, within twenty-four hours after becoming cognizant of the fact, give notice thereof to the clerk of the board of trustees of the school district in which said person so afflicted resides. * * *

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SEC. 1108. Should one or both eyes of an infant become inflamed or swollen or reddened, or should any pus or secretion form in the eyes or upon the edge of the lid, at any time within two weeks after birth, it shall be the duty of any midwife, nurse, or other person having charge of such infant to report, within six hours after discovery of such inflammation, redness, or formation of pus or secretion, to the local health officers, or to some legally qualified practitioner of medicine in the district in which such case shall occur, the fact that such inflammation, swelling, or redness or accumulation in the eye exists. Any failure to comply with the provisions of this section shall be punished by a fine of not to exceed one hundred dollars, or imprisonment not to exceed ninety days, or by both fine and imprisonment, in the discretion of the court.

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SEC. 1099. Every physician or other person called to attend any person who is suffering from smallpox, cholera, plague, yellow fever, typhus fever, diphtheria, membranous croup, scarlet fever, typhoid fever, or any other disease dangerous to the public health or required by the State board of health to be reported, shall report the same to the health officers within whose jurisdiction such person is found, giving in such report the name, age, sex, and color of the patient, and the house or place in which such person may be found. * * * In like manner it shall be the duty of the head of the family and of the owner or the agent of the owner of the building in which a person resides who has any of the diseases herein named or provided against, or in which are the remains of a person having died of any such disease, immediately after becoming aware of the fact to give notice thereof to the health officer.

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SEC. 1111. It is the duty of every practicing physician to report promptly to the county physician of the county in which he resides, all or any dangerous disease of an infectious or contagious nature under treatment by him. * * * Any person violating the provisions of this chapter * * * is guilty of a misdemeanor.

ILLINOIS.

[Rev. Stat., 1909, ch. 34.]

SEC. 117. The said (county and township) boards of health shall have the following powers:

* * * * * * *

Fifth. To require reports of dangerously communicable diseases.

[Rev. Stat., 1909, ch. 38.]

SEC. 510. Should any midwife or nurse having charge of an infant in this State notice that one or both eyes of such infant are inflamed or reddened at any time within two weeks after its birth, it shall be the duty of such midwife or nurse having charge of such infant to report the fact in writing within six hours to the health officer or some legally qualified practitioner of medicine of the city, town, or district in which the parents of the infant reside.

SEC. 511. Any failure to comply with the provisions of this act shall be punishable by a fine not to exceed one hundred dollars or imprisonment not to exceed six months, or both.

[Rev. Stat., 1909, ch. 126a.]

SEC. 2. The State board of health * * * shall have authority to make such rules and regulations and such sanitary investigations as they may from time to time deem necessary for the preservation and improvement of the public health. * * * It shall be the duty of all local boards of health, health authorities, and officers, police officers, sheriffs, constables, and all other officers and employees of the State, or any county, village, city, or township thereof to enforce the rules and regulations that may be adopted by the State board of health.

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SEC. 3. The board of health shall * * * make up such forms and recommend such legislation as shall be deemed necessary for the thorough registration of vital and mortuary statistics throughout the State. * * *

* * * * * * *

SEC. 12. It shall be the duty of the board of health to make an annual report, through their secretary, or otherwise in writing to the governor of this State, on or before the first day of January of each year, and such report shall include * * * such information concerning vital statistics, such knowledge respecting diseases * * * as may be thought useful by the board for dissemination among the people. * * *

[Acts of 1911, p. 330.]

Sec. 2. Every employer in this State engaged in the carrying on of any process of manufacture or labor in which sugar of lead, white lead, lead chromate, litharge, red lead, arsenate of lead, or Paris green are employed, used, or handled, or the manufacture of brass or the smelting of lead or zinc, which processes and employments are hereby declared to be especially dangerous to the health of the employees engaged in any process of manufacture or labor in which poisonous chemicals, minerals, or other substances are used or handled by the employees therein in harmful quantities or under harmful conditions, shall provide for and place at the disposal of the employees engaged in any such process or manufacture, and shall maintain in good condition and without cost to the employees, proper working clothing to be kept and used exclusively for such employees while at work, and all employees therein shall be required at all times while they are at work to use and wear such clothing; and in all processes of manufacture or labor referred to in this section which are unnecessarily productive of noxious or poisonous dusts, adequate and approved respirators shall be furnished and maintained by the employer in good condition and without cost to the employees, and such employees shall use such respirators at all times while engaged in any work necessarily productive of noxious or poisonous dusts.

Sec. 3. Every employer engaged in carrying on any process or manufacture referred to in section 2 of this act shall, as often as once every calendar month, cause all employees who come into direct contact with the poisonous agencies or injurious processes referred to in section 2 of this act, to be examined by a competent licensed physician for the purpose of ascertaining if there exists in any employee any industrial or occupational disease or illness or any disease or illness due or incident to the character of the work in which the employee is engaged.

Sec. 4. It is hereby made the duty of any licensed physician who shall make the physical examination of the employees under the provisions of section 3 of this act, to make an immediate report thereof to the State board of health of the State of Illinois upon blanks to be furnished by said board upon request, and if no such disease or illness is found, the physician shall so report, and if any such disease is found, the report shall state the name, address, sex, and age of such employee and the name of such employer, and the nature of the disease or illness with which the employee is afflicted, and the probable extent and duration thereof, and the last place of employment: *Provided*, That the failure of any such physician to receive the blanks of the State board of health for the making of such report, shall not excuse such physician from making the report as herein provided.

Sec. 5. The secretary of the State board of health shall, immediately upon receipt of any report from any physician in accordance with the provisions of section 4 of this act, transmit a copy thereof to the Illinois department of factory inspection.

Sec. 14. Any person, firm, or corporation who shall, personally or through any agent, violate any of the provisions of this act, or who omits or fails to comply with any of its requirements * * * shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished for the first offense by a fine of not less than ten dollars ($10) or more than one hundred dollars ($100), and upon conviction of the second or subsequent offenses shall be fined not less than fifty dollars ($50) or more than two hundred dollars ($200), and in each case shall stand committed until such fine and costs are paid, unless otherwise discharged by due process of law.

INDIANA.

[Burns' Annotated Statutes, 1908.]

Sec. 7596. It shall be the duty of the State board of health to collect and tabulate the vital statistics, to study them and endeavor to make intelligent and profitable use of the same for sanitary purposes and the benefit of the people. They shall have supervision of the system of registration of * * * infectious and contagious diseases, and they shall make up from time to time such blank forms as they may deem necessary for the collection, registration, and report of vital and sanitary statistics throughout the State. * * *

* * * * * * *

Sec. 7607. It shall be the duty of all physicians and midwives in the State to report upon blank forms supplied by the State board of health * * * all cases of contagious and infectious diseases which may occur under their supervision and which are listed as reportable in the rules of the State board of health. The reports of * * * cases of infectious diseases shall be made immediately. * * * Reports of * * * cases of such infectious and contagious diseases as are listed in the rules of the State board of health, which occur in cities and towns, shall be made to health officers of said cities and towns, and when they occur in the country outside of cities and towns they shall be reported to the county health officer or his deputies. * * * When any * * * case of listed infectious or contagious disease may occur with no physician or midwife in attendance, then said * * * case of infectious or contagious disease shall be reported by the householder or other person having said * * * case of infectious or contagious disease in charge to the nearest health officer or his deputy, and the officer to whom the report is made shall make inquiry and inspection * * * and all reports of * * * contagious or infectious diseases as herein commanded shall be made upon blanks furnished by the State board of health. * * * All records of * * * cases of contagious and infectious diseases shall be kept by health officers in record books, the forms of which shall be supplied by the State board of health. Any physician or midwife refusing or neglecting to make * * * infectious or contagious disease reports as herein provided shall, upon conviction, be fined for the first offense in any sum not less than ten or more than fifty dollars, and any physician or midwife who is convicted the second time for the violation of any of the above provisions shall be fined not less than fifty or more than one hundred dollars, and any physician or midwife who is convicted the third time for the violation of any of the above provisions shall be fined one hundred dollars. Householders and others made responsible in this act and failing to report as herein provided shall, upon conviction, be fined not less than ten nor more than fifty dollars for each offense. * * *

* * * * * * *

Sec. 7612. Any physician called upon to attend a sick person and who finds the cause of such sickness to be of a contagious or infectious character, or if the disease is ordered to be reported in the rules of the State board of health, such physician shall immediately report the facts to the secretary of the board of health having jurisdiction.

Sec. 7613. Whenever any person knows or has reason to believe that any member of his or her family or household (boarder, roomer, or visitor) has either smallpox, diphtheria, membranous croup, scarlet fever, measles, or any other communicable disease listed in the rules of the State board of health, he or she shall immediately, from the time the existence of the disease is known, if no physician is in attendance, give notice thereof to the local health officer of the town or city in which the disease occurs, or the health officer if the case is without the corporation of cities or towns, and such notice shall be given either verbally or by written communication, mailed or delivered to such health officer or board.

[Acts of 1911, ch. 129.]

Sec. 3. Should one or both eyes of an infant become inflamed, swollen, or reddened, or show any unnatural discharge or secretion at any time within two weeks after its birth, and no legally qualified physician is in attendance upon the infant at that time, it shall be the duty of its parents, or, in their absence, whoever is caring for said infant, to report the fact in writing, within six hours after discovery, to the health officer having jurisdiction: provided, said report to said health officer need not be made from recognized hospitals.

SEC. 5. Any violation of the provisions of this act shall be punished by a fine of not less than ten dollars and not more than fifty dollars.

IOWA.

[Code of 1897.]

SEC. 1027. It shall be the duty of such clerk and physician [to the board of health in cities under special charters] to report at least once a year to the State board of health * * * such other facts as may be required in blanks in accordance with instructions received from the State board. They shall also make special reports whenever required so to do by the State board.

SEC. 1028. The local board of health [in cities under special charters] shall make such rules and regulations and orders respecting * * * the prompt report of contagious or infectious diseases; * * * causes of sickness within their jurisdiction, and on all boats in its ports and harbors, or railroad cars passing through such city; * * * and shall, from time to time, report to the city council ordinances for carrying such rules, regulations, and provisions into effect. * * *

* * * * * * *

SEC. 2565. The board (State board of health) shall have * * * authority to make such rules and regulations and sanitary investigations as it from time to time may find necessary for the preservation and improvement of the public health, which when made shall be enforced by local boards of health and peace officers of the State. It shall * * * by its secretary make biennial reports to the governor, which shall include * * * such information concerning vital statistics, such knowledge respecting diseases * * * as may be thought useful for dissemination among the people. * * *

* * * * * * *

SEC. 2568. * * * The quarantine authorized by this section in case of infectious or contagious diseases may be declared or terminated by the mayor of any city or town, or the township clerk outside of such city or town, in cases required by regulations of the State board of health, upon written notice given by any practicing physician of the existence of such disease, or termination of the cause for quarantine, as the case may be.

[Acts of 1896, ch. 57.[1]]

SECTION 1. Should one or both eyes of an infant become inflamed, or swollen, or reddened at any time within two weeks after its birth, it shall be the duty of the midwife, parent, guardian, or nurse, or other person having charge of such infant, to report within six (6) hours after the discovery thereof by such person in charge of such infant to the health officer or some legally qualified practitioner of the city, town, or district in which the parents of the infant reside, that such inflammation, or swelling, or redness of the eyes exists.

* * * * * * *

SECTION 3. Any failure to comply with the provisions of this act shall be punished by a fine of not less than twenty-five dollars or more than one hundred dollars or imprisonment in the county jail not to exceed thirty days, or both.

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[1] Omitted from code of 1897. Sec. 27, ch. 20, acts of 1897, declares that the code is "the authoritative publication of the existing laws of the State."

KANSAS.

[General Statutes, 1909.]

SEC. 8031. The State board of health shall supervise * * * the registration of forms of disease prevalent in the State, and the secretary of said board shall superintend the registration of the vital statistics of the State. * * *

* * * * * * *

SEC. 8061. Tuberculosis is hereby declared to be an infectious and communicable disease, dangerous to the public health. It shall be the duty of every physician in the State of Kansas to report in writing, on a form to be furnished as hereinafter provided, the name, age, sex, color, occupation, place where last employed if known, and address of every person known by said physician to have tuberculosis, to the county health officer; or in cities of the first class, to the city health officer, in which said person resides, within twenty-four hours after such fact comes to the knowledge of said physician. It shall also be the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar private or public institution in said State of Kansas to report in like manner the name, age, sex, color, occupation, place where last employed, if known, and previous address of every patient having tuberculosis who comes into his care or under his observation, within twenty-four hours thereafter.

* * * * * * *

SEC. 8074. Whenever any physician shall know or have reason to believe that any person whom he is called to visit, or any person sick within his knowledge without the care of a physician, is sick with or has died of cholera, smallpox, scarlet fever, diphtheria, epidemic cerebrospinal meningitis, or any disease dangerous to the public health, he shall immediately give notice thereof to the nearest board of health or health officer. * * *

SEC. 8075. Whenever any householder shall know that any of his family is sick with or has died of smallpox, cholera, scarlet fever, diphtheria, epidemic cerebrospinal meningitis, or any disease dangerous to the public health, he shall immediately give notice thereof to the nearest board of health or health officer. * * *

SEC. 8076. Any municipal or county board of health or health officer having knowledge of any infectious or contagious disease, or of a death from such disease, within their jurisdiction, shall immediately exercise and maintain a supervision over such case or cases during their continuance. * * * The local board of health or health officer shall communicate without delay all information as to existing conditions to the State board of health.

KENTUCKY.

[Russell's Statutes, 1909.]

SEC. 1743. * * * and it shall be the duty of physicians practicing their profession in any county in which a local board is organized to report all or any of the above-mentioned diseases [cholera, smallpox, yellow fever, scarlet fever, diphtheria, and other epidemic and communicable diseases] under their special treatment to such local board, and it shall likewise be the duty of heads of families to report any of said diseases, when known by them to exist in their respective families, to such local board, or to some member thereof, within twenty-four hours from his or her knowledge of the existence of such disease, and such local board shall make report to the State board of health at least once in every three months.

First. Of the character of the infectious, epidemic, and communicable diseases prevailing in their county.

Second. The number reported as afflicted with such disease.

* * * * * * *

Sec. 1764 (as amended by ch. 11, Acts of 1910). The sum of thirty thousand dollars per annum * * * is appropriated for the following purposes * * *:

* * * * * * *

(c) To establish and maintain a bureau of vital statistics, that the causes of sickness and mortality may be known and utilized.

Sec. 1770. * * * Any physician or head of a family who shall fail or refuse to report to the local board of health cases of cholera, smallpox, yellow fever, scarlet fever, diphtheria, and other epidemic diseases, as provided for in section two thousand and fifty-five of the act mentioned in the title of this act, shall be fined not less than five dollars for each day he neglects or refuses to report.

* * * * * * *

[Acts of 1910, ch. 37.]

Sec. 18. The State board of health shall prepare, print, and supply to all registrars suitable blanks and forms used in registering, recording, and preserving the returns or in otherwise carrying out the purposes of this act; and shall prepare and issue such detailed instructions as may be required to secure the uniform observance of its provisions and the maintenance of a perfect system of registration. And no other blanks shall be used than those supplied by the State board of health. The State registrar shall carefully examine the certificates received monthly from the local registrars, and if any such are incomplete or unsatisfactory, he shall require such further information to be furnished as may be necessary to make the record complete and satisfactory. And all physicians, midwives, or undertakers, connected with any case, are hereby required to furnish such information as they may possess regarding any birth, sickness or death, upon demand of the State registrar in person, by mail, or through the local registrar. He shall further arrange, bind, and permanently preserve the certificates in a systematic manner, and shall prepare and maintain a comprehensive and continuous card index of all births, sickness, and deaths registered, the cards to show the name of child, deceased, place and date of birth, sickness or death, number of certificate, and the volume in which it is contained. He shall inform all registrars what diseases are to be considered as infectious, contagious, or communicable and dangerous to the public health, as decided by the State board of health, in order that when sickness and deaths occur from such diseases proper precautions may be taken to prevent the spreading of dangerous diseases.

LOUISIANA.

[Act No. 192, 1898.]

Sec. 3 (as amended by Act 150, 1902). * * * It [the State board of health] shall prepare or cause to be prepared a sanitary code for the State of Louisiana, * * * said code shall cover and provide for * * * the reporting * * * of cases of infectious and contagious diseases. * * *

Sec. 8. In the event that any case shall be reported to or come to the knowledge of any local board, which is either deemed to be a case of contagious or infectious disease, or suspected of so being, the local board shall immediately * * * communicate the fact by the most expeditious means at hand to the State board of health. * * *

[Sanitary Code, 1909.]

62. (*a*) Whenever in any community of this State, any nurse, midwife, or other person not a legally qualified practitioner of medicine shall notice inflammation of the eyes or redness of the lids in a newborn child under his or her care, it shall be the duty of such person to report the same to the town or parish health officer within twelve hours of the time the disease is first noticed.

* * * * * * * *

MAINE.

[Rev. Stat., 1903, ch. 18.]

SEC. 30. * * * It [the local board of health] shall report to the State board of health promptly facts which relate to infectious and epidemic diseases, and every case of smallpox, varioloid, diphtheria, scarlet fever, typhoid fever, cerebrospinal meningitis, measles, membranous croup so called, whooping cough, and pulmonary tuberculosis or consumption, as it is commonly termed, occurring within the limits of its jurisdiction, and such notification shall be in accordance with the requirements of the blanks furnished by the said State board. * * *

* * * * * * *

SEC. 33 (as amended by ch. 78, Acts of 1909). Whenever any householder knows or has reason to believe that any person within his family or household has smallpox, diphtheria, scarlet fever, cholera, typhus or typhoid fever, cerebrospinal meningitis, measles, membranous croup so called, or whooping cough, he shall within twenty-four hours give notice thereof to the health officer of the town in which he resides, and such notice shall be given either at the office of the health officer or by a communication addressed to him and duly mailed within the time above specified, and in case there is no health officer to the secretary of the local board of health, either at his office or by communication, as aforesaid.

* * * * * * *

SEC. 36. Whenever any physician knows or has reason to believe that any person whom he is called upon to visit is infected with any of the diseases mentioned in section thirty-three, such physician shall, within twenty-four hours, give notice thereof to the secretary of the local board of health or the health officer of the town in which such person lives.

* * * * * * *

SEC. 90. If one or both eyes of an infant become reddened or inflamed at any time within four weeks after birth, the midwife, nurse, or person having charge of said infant shall report the condition of the eyes at once to some legally qualified practitioner of medicine of the city, town, or district in which the parents (of the infant) reside. Any failure to comply with the provisions of this section shall be punishable by a fine not to exceed one hundred dollars or imprisonment not to exceed six months.

[Acts of 1909, ch. 78.]

SEC. 1. The State board of health of Maine shall keep a register of all persons in this State who are known to be affected with tuberculosis. The State board of health shall have sole and exclusive control of said register and shall not permit inspection thereof nor disclose any of its personal particulars except to its own agents or to local officials when in the interest of the public health and safety it is deemed necessary to do so.

SEC. 2. Tuberculosis is hereby declared to be an infectious and communicable disease, dangerous to the public health. It shall be the duty of every physician in the State of Maine to report in writing, on forms to be furnished by the State board of health, the name, age, sex, color, occupation, place where last employed if known, and address of every person known by said physician to have tuberculosis to the secretary of the State board of health within forty-eight hours after such fact comes to the knowledge of said physician. The name of the householder where the tuberculous person lives or boards and such other facts as may be called for on the blank reports issued from the office of the State board of health shall also be included in the report. It shall also be the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, sanatorium, or other similar private or public institution in the State of Maine to report to the State board of health in like manner the name, age, sex, color, occupation, place where last employed if known, and previous address of every patient having tuberculosis who comes into his care or under his observation within forty-eight hours thereafter. It shall also be the duty of said physician or chief officer to give notice to the secretary of the State board of health of the change of address of any tuberculous patient who is or has lately been under his care if he is able to give such information.

MARYLAND.

[Code of 1904, art. 27.]

SEC. 231. If at any time within two weeks after the birth of any infant one or both of its eyes, or the eyelids, be reddened, inflamed, swollen, or discharging pus, the midwife, nurse, or person other than a legally qualified physician, in charge of such infant, shall refrain from the application of any remedy for the same, and shall immediately report such condition to the health commissioner or to some legally qualified physician in the city, county, or town wherein the infant is cared for. Any person or persons violating the provisions of this section shall, on conviction, be punished by a fine not to exceed one hundred dollars, or by imprisonment in jail not to exceed six months, or by both fine and imprisonment.

[Code of 1904, art. 43.]

SEC. 21 B (created by ch. 560, acts of 1910). The bureau of communicable diseases [of the State board of health] shall secure accurate and complete returns of communicable diseases in Maryland. * * *

* * * * * * *

SEC. 29. * * * He [any local or county health officer] shall promptly notify the secretary of the State board of health of the existence of any epidemic or unusual sickness or mortality that may come to his knowledge within his own sanitary jurisdiction or contiguous thereto. * * *

* * * * * * *

SEC. 50. Whenever any householder knows that a person within his family or house is sick of smallpox, diphtheria, membranous croup, scarlet fever, typhoid fever, typhus fever, measles, mumps, whooping cough, or any other infectious or contagious disease dangerous to the public health, he shall immediately give notice thereof to the board of health of the city or county in which he dwells. * * *

* * * * * * *

SEC. 51. Whenever any physician knows that any person whom he is called to visit is infected with smallpox, diphtheria, membranous croup, scarlet fever, typhoid fever, typhus fever, yellow fever, measles, whooping cough, or any other contagious or infectious disease dangerous to public health, he shall immediately give notice thereof in writing over his own signature, to the board of health of the city or town or county in which such disease exists; and if he refuses or neglects to give such notice he shall be fined not less than fifty nor more than two hundred dollars.

SEC. 52. The boards of health in the several cities, towns, and counties shall cause a record to be kept of all reports received in pursuance of sections fifty and fifty-one and such record shall contain the names of all persons who are sick with infectious or contagious diseases, the localities in which they live, the disease with which they are affected, together with the date and names of the persons reporting any such cases, and the record of quarantine, isolation, disinfection, and other preventive measures. * * *

SEC. 53. When any board of health has had notice of the occurrence, within its sanitary jurisdiction, of a case of smallpox, or any other contagious or infectious disease dangerous to public health, such board of health shall, within twenty-four hours after the receipt of such notice, notify the State board of health of the same.

* * * * * * *

Sec. 56. The State board of health of Maryland shall keep a register of all persons in this State who are known to be affected with tuberculosis. The State board of health shall have sole and exclusive control of said register, and shall not permit inspection thereof nor disclose any of its personal particulars except to officials authorized under the laws of Maryland to receive such information.

Sec. 57. The superintendent or other person in charge or control of any hospital, dispensary, school, reformatory, or other institution deriving the whole or any part of its support from the public funds of the State of Maryland or any city, town, or county in the State of Maryland, having in charge or under care or custody any person or persons suffering with pulmonary or laryngeal tuberculosis shall within forty-eight hours after recognition of such disease make or cause to be made in the manner and form prescribed by the State board of health a record of the name, age, sex, color, occupation, social condition, and residence of the person or persons so affected, together with such other information as may seem necessary or important. And all such records shall be delivered under seal to the State board of health on Monday of the week immediately following that in which the records were made. * * *

Sec. 58. Whenever any physician knows that any person under his professional care is affected with pulmonary or laryngeal tuberculosis he shall transmit to the secretary of the State board of health within seven days and upon blanks provided by the State board of health for that purpose the name, age, sex, color, occupation, social condition, and residence of such person, and any physician failing or refusing to comply with the requirements of this section shall be deemed guilty of a misdemeanor and on conviction thereof shall be subject to a fine of ten dollars.

* * * * * * *

Sec. 67. Whenever any hotel keeper, keeper of a boarding or lodging house, superintendent, manager, or director of a private or public institution of any kind, shall know or be informed by a physician, or shall have reason to believe that any guest, inmate, or other person in the hotel, boarding house, lodging house, or institution over which he or she may have control or supervision, or on the premises thereof, is sick with or convalescing from smallpox, cholera, yellow fever, typhus or typhoid fever, scarlet fever, leprosy, or any other contagious or infectious disease, the said owner, proprietor, manager, or other person having charge shall immediately give notice thereof in writing to the health officer of the city or town in which the infected house or premises is located, or to the secretary of the State board of health if there is no local health officer who can efficiently deal with the case; said notice shall state the name and place of residence of the person sick, the name of the disease, the name of the owner, proprietor, or manager of the house, and the locality of said house. * * *

Sec. 68. Any person or persons who shall neglect or refuse to comply with the provisions of the two foregoing sections shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof in a court of competent jurisdiction, be fined not more than fifty dollars for every such offense.

MASSACHUSETTS.

[Revised Laws, 1902, ch. 75.]

Sec. 49 (as amended by Acts of 1910, ch. 269). A householder who knows that a person in his family or house is sick of smallpox, diphtheria, scarlet fever, or any other infectious or contagious disease declared by the State board of health to be dangerous to the public health shall forthwith give notice thereof to the board of health of the city or town in which he dwells. * * * Should one or both eyes of an infant become inflamed, swollen, and red, and show an unnatural discharge at any time within two weeks after its birth it shall be the duty of the nurse, relative, or other attendant having charge of such infant to report in writing within six hours thereafter to the board of health of the city or town in which the parents of the infant reside the fact that such inflammation, swelling, and redness of the eyes and unnatural discharge exist. * * *

SEC. 50 (as amended by Acts of 1907, ch. 480). If a physician knows that a person whom he is called to visit is infected with smallpox, diphtheria, scarlet fever, or any other disease declared by the State board of health to be dangerous to the public health, or if one or both eyes of an infant whom or whose mother he is called to visit become inflamed, swollen, and red, and show an unnatural discharge within two weeks after the birth of such infant, he shall immediately give notice thereof in writing over his own signature to the selectmen or board of health of the town; and if he refuses or neglects to give such notice he shall forfeit not less than fifty nor more than two hundred dollars for each offense.

SEC. 51. The board of health shall keep a record, in blank books to be provided by the secretary of the Commonwealth, of all reports received pursuant to the two preceding sections, which shall contain the name and location of all persons who are sick, their disease, the name of the person who reports the case, and the date of such report. Said board shall give immediate information to the school committee of all contagious diseases so reported to them.

SEC. 52 (amended by Acts of 1907, ch. 480). If the board of health of a city or town has had notice of a case of smallpox. diphtheria, scarlet fever, or of any other disease declared by the State board of health to be dangerous to the public health therein, it shall within twenty-four hours thereafter give notice thereof to the State board of health stating the name and location of the patient so afflicted, and the secretary thereof shall forthwith transmit a copy of such notice to the State board of charity.

SEC. 53 (amended by Acts of 1902, ch. 213). If such board refuses or neglects to give such notice, the city or town shall forfeit its claim upon the Commonwealth for the payment of expenses as provided in section one of chapter two hundred and thirteen of the acts of the year nineteen hundred and two.

[Acts of 1907, ch. 183.]

SEC. 1. The State board of health is hereby authorized and directed to define what diseases shall be deemed to be "dangerous to the public health," as the term is used in chapter two hundred and thirteen of the acts of the year nineteen hundred and two.

MICHIGAN.

[Compiled Laws of 1897.]

SEC. 4452. Whenever any householder, hotel keeper, keeper of a boarding house, or tenant shall know, or shall be informed by a physician, or shall have reason to believe that any person in his family, hotel, boarding house, or premises is taken sick with smallpox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he shall immediately give notice, in writing, thereof to the health officer of the township, city, or village in which he resides. Said notice shall state the name of the person sick, the name of the disease, if known, the name of the householder, hotel keeper, keeper of boarding house, or tenant giving the notice, and shall, by street and number, or otherwise, sufficiently designate the house in which he resides or the room in which the sick person may be; and if he shall refuse or wilfully neglect immediately to give such notice, he shall be deemed guilty of a misdemeanor, and upon conviction thereof he shall be punished by a fine of not exceeding one hundred dollars and costs of prosecution; or in default of payment thereof, by imprisonment not exceeding ninety days in the county jail, in the discretion of the court * * *.

SEC. 4453. Whenever any physician shall know that any person whom he is called to visit, or who is brought to him for examination, is infected with smallpox, cholera, diphtheria, scarlet fever, or any other disease dangerous to the public health, he shall immediately give notice thereof to the health officer of the township, city, or village in which the sick person may be; and to the householder, hotel keeper, keeper of a boarding house, or tenant within whose house or rooms the sick person may be. The notice to the officer of the board of health shall state the name of the disease, the name, age, and sex of the person sick, also the name of the physician giving the notice; and shall, by street and number, or otherwise, sufficiently designate the house or room in which said person sick may be. * * *

Sec. 4454. For each complete notice in writing to an officer of the board of health, in full compliance with the preceding section, requiring from physicians, or other person, notices of diseases dangerous to the public health, the physician who gave the notice shall be entitled, on duly certifying that each notice was correct, and when the bill has been duly audited by the board of health, to receive from the township, city, or village, in which the notice was given, the sum of ten cents.

* * * * * * *

Sec. 4460. Whenever the health officer of any township, city, or village in this State shall receive reliable notice or shall otherwise have good reason to believe that there is within the township, city, or village of which he is the health officer, a case of smallpox, diphtheria, scarlet fever, or other communicable disease dangerous to the public health, it shall be the duty of said health officer, * * * to keep the president of his own board of health, and the secretary of the State board of health constantly informed respecting every outbreak of a disease dangerous to the public health, and of the facts so far as the same shall come to his knowledge, respecting sources of danger of any such diseased person or infected article being brought into or taken out of the township, city, or village of which he is the health officer.

* * * * * * *

Sec. 4475. Should one or both eyes of an infant become inflamed or swollen, or reddened, or should any pus or secretion form in the eyes or upon the edge of the lids, at any time within two weeks after birth, it shall be the duty of any midwife, nurse, or other person having charge of such infant to report in writing within six hours after discovery of such inflammation, redness, or formation of pus or secretion, to the local health officer or some legally qualified practitioner of medicine in the city, town, or district in which such case shall occur, the fact that such inflammation, swelling, or redness, or accumulation in the eyes exists.

[Public acts of 1909, No. 27, as amended by Act 317, 1909, and Act 80, 1911.]

Sec. 1. Tuberculosis is hereby declared to be an infectious and communicable disease. It shall be the duty of every physician in the State of Michigan to report in writing on a form to be furnished as hereinafter provided, the name, nativity, age, sex, color, occupation, place where last employed if known, and address, of every person known by said physician to have tuberculosis, to the health officer of the township, city, or village in which said person resides, within twenty-four hours after such fact comes to the knowledge of said physician. It shall also be the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar private or public institution in said State of Michigan, to report in like manner the name, nativity, age, sex, color, occupation, place where last employed, if known, and previous address of every patient having tuberculosis who comes into his care or under his observation, within twenty-four hours thereafter.

Sec. 2. This report shall be upon a blank form furnished by the State board of health, and such blank, in addition to the name, color, age, sex, nativity, occupation, place where last employed, and present address, as stated above, shall give also the evidence upon which the diagnosis of tuberculosis has been made, the part of the body affected, and the stage of the disease. * * *

"Sec. 4. *Protection of records.*—It shall be the duty of every health officer of a township, city, or village to cause all reports made in accordance with the provisions of the first section of this act, and also all results of examinations showing the presence of the bacilli of tuberculosis made in accordance with the provisions of the third section of this act, to be recorded in a register to be furnished by the State board of health, of which he shall be the custodian, and a copy of which he shall transmit quarterly to the State board of health. Such register shall not be open to inspection by any person other than the health authorities of the State and of the said township, city, or village, and said health authorities shall not permit any such report or record to be divulged so as to disclose the identity of the person to whom it relates, except as may be necessary to carry into effect the provisions of this act. The cost of all blanks, vouchers, and registers by this act required to be furnished or issued by the State board of health shall be paid for by the board of State auditors out of the general fund in the State treasury, on presentation of vouchers approved by the secretary of the State board of health.

"SEC. 11. *Penalty for failure of physician to perform duties or for making false reports.*—Any physician or person practicing as a physician who shall fail to report any case of tuberculosis or who shall knowingly report as affected with tuberculosis any person who is not so affected, or who shall wilfully make any false statement concerning the name, nativity, age, sex, color, occupation, place where last employed, if known, or address of any person reported as affected with tuberculosis, or who shall certify falsely as to any of the precautions taken to prevent the spread of infection, shall be deemed guilty of a misdemeanor and on conviction thereof shall be subject to a fine of not more than one hundred dollars.

"SEC. 12. *Reporting recovery of patient.*—Upon the recovery of any person having tuberculosis, it shall be the duty of the attending physician to make a report of this fact to the local health officer, who shall record the same in the records of his office, and shall relieve said person from further liability to any requirements imposed by this act.

"SEC. 12a. In addition to the requirements of the reports hereinbefore provided, such reports shall comprehend the occupation at the time disease was contracted and the date thereof, as near as can be, the time thereafter continued at such occupation and all subsequent occupations and term of each to the time of the death or recovery of any person having tuberculosis, and it shall be the duty of every health officer of township or village or city to cause all reports to be made in accordance with the first section of this act, and this section and record copy transmitted as required by section four, and upon the receipt of the full quarterly report by the State board of health, said State board of health shall compile such report to show the number and location of each case, the number of deaths and number of recoveries, the age, sex, color, occupation at time person contracted, the disease, the time continued in the occupation when disease was contracted and all subsequent occupations and term of each up to death or recovery of such person, and so classify same, showing percentage of deaths in each trade or occupation from tuberculosis, as compared with the whole number of deaths in such trade or occupation as shown by the latest reports of local physicians to the local health boards as reported to the State board of health: *Provided*, That such compilation shall be published once every year in the reports of said State board of health; that such reports so made up shall be at all times open to the inspection of the public: *Provided further*, That the names of the persons so diseased shall not be published.

"SEC. 13. *General penalty.*—Any person violating any of the provisions of this act shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished, except as herein otherwise provided, by a fine of not less than five dollars nor more than fifty dollars.

"SEC. 14. *Repealing all acts, et cetera.*—All acts and parts of acts contrary to or inconsistent with the provisions of this act are hereby repealed."

[Public Acts of 1909, No. 293.]

Sec. 1. * * * The said State board of health is hereby expressly authorized to designate what diseases are dangerous communicable diseases and what diseases are contagious diseases, and it shall be the duty of every local board of health and health officer to observe such rules in relation to dangerous communicable diseases and contagious diseases as may be prescribed by the said State board of health.

[Laws of 1911, act 119.]

Section 1. Every physician attending or called upon to treat a patient whom he believes to be suffering from poisoning from lead, phosphorus, arsenic, or mercury, or their compounds, or from anthrax, or from compressed air illness, contracted as a result of the nature of the patient's employment, shall send to the State board of health, who shall transmit to the commissioner of labor a notice stating the name, post-office address, and place of employment of the patient, the length of time of such employment, and the disease from which, in the opinion of the physician, the patient is suffering.

Sec. 2. Any physician who shall fail to make any report required by the preceding section, or who shall wilfully make any false statement in such report, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than fifty dollars.

Sec. 3. It shall be the duty of the commissioner of labor and of the prosecuting attorney of the county where anyone violating the provisions of this act may reside, to prosecute all violations of the provisions of this act which shall come to the knowledge of them or either of them.

MINNESOTA.

[Revised Laws of 1905.]

Sec. 2130. The board [State board of health] shall * * * gather and diffuse proper information upon all subjects to which its duties relate. It shall gather, collate, and publish medical and vital statistics of general value * * *

Sec. 2131. The board [State board of health] may adopt, alter, and enforce reasonable regulations of permanent application throughout the whole or any portion of the State, or for specified periods in parts thereof, for the preservation of the public health. Upon the approval of the attorney general, and the due publication thereof, such regulations shall have the force of law, except in so far as they may conflict with a statute or with the charter or ordinances of a city of the first class upon the same subject. In and by the same the board may control * * * any of the following matters:

* * * * * * *

7. * * * the reporting of sicknesses and deaths therefrom.

* * * * * * *

Sec. 2135. All local boards of health and health officers shall make such * * * reports, and obey such directions concerning communicable diseases, as the State board may require or give. * * *

MISSISSIPPI.

[Code of 1906, ch. 34.]

1645. The duties of the bureau on vital statistics of the department shall be (1) to appoint a county board of health in each county of the State, consisting of one physician of skill from each supervisor's district, for the purpose of collecting vital, mortuary, and sanitary statistics, of which board the county health officer shall be chairman; and said board may keep books of register for * * * infectious diseases, in which may be kept a register of all the * * * infectious diseases that may occur in the county.

(2) To carry out the rules and regulations as to the collection of vital, mortuary, and sanitary statistics in the State that shall be adopted by the State board of health.

* * * * * * *

2498. Every practicing or licensed physician shall report immediately to the secretary of the State board of health every case of yellow fever, cholera, dengue, smallpox or other virulent epidemic contagious diseases that occurs within his practice, unless the State board of health shall otherwise direct. * * *

2505. Any municipality may * * * enforce the collection and registration of * * * health and mortuary statistics; but the same shall be subject to and not inconsistent with the rules and regulations of the State board of health touching the health interests of the county in which such city, town, or village is situated.

[Acts of 1910, ch. 130.]

Sec. 1. It shall be the duty of all practicing physicians in this State to report to the secretary of the State board of health any and all cases of tuberculosis, consumption or other pulmonary diseases, which they shall be called on to examine or treat, within ten days after receiving knowledge of such cases. * * *

Sec. 3. Any practicing physician who shall fail to make the reports provided for in section 1 of this act, shall be guilty of a misdemeanor, and, upon conviction, shall be fined not less than ten dollars nor more than fifty dollars.

MISSOURI.

[Annotated Codes of 1906.]

Sec. 7520. The State board of health shall * * * recommend to the municipal authorities of any city, or to the county courts of any county, the adoption of any rules that they may deem wise or expedient for the protection and preservation of the health of the citizens thereof.

Sec. 7528. It shall be the duty of the board of health to make annual report, through its secretary or otherwise, in writing, to the governor of this State, on or before the first day of January of each year, and such report shall include * * * such information concerning vital and mortuary statistics, such knowledge respecting diseases * * * as may be thought useful by the board for dissemination among the people. * * *

MONTANA.

[Revised Codes, 1907.]

Sec. 1486. * * * He [the secretary of the local board of health] shall keep accurate records of all communicable diseases reported to him, and for this purpose each local board of health shall provide, at the expense of the city or town, a book printed in proper blank form for the notation of such facts and data as may be prescribed by the regulations of the State board of health. * * *

* * * * * * *

Sec. 1495. * * * He [the local and county health officer] shall on or before the fifth day of each month, transmit to the secretary of the State board of health, on blanks provided therefor, a complete report of all communicable diseases reported to him during the previous month, giving all the details regarding each case as indicated by the blank forms provided by the State board of health. * * *

* * * * * * *

Sec. 1500. The term "communicable disease" as used in this act, shall be understood to include the following diseases: Smallpox, diphtheria, membranous croup, so-called scarlet fever, sometimes called scarlet rash or scarlatina, cholera, bubonic plague, yellow fever, "spotted" or "tick" fever, typhus fever, enteric or typhoid fever, cerebro spinal meningitis and measles.

Sec. 1501. Whenever any householder knows or has reason to believe that any person within his family or household has any communicable disease, he shall immediately give notice thereof to the health officer of the town or city in which he resides, if within the corporate limits of a town or city, or to the county health officer if without the corporate limits of a town or city, and such notice shall be given at the office of the local or county health officer within the shortest possible time and by the most direct means of communication.

Sec. 1502. Whenever any physician knows that any person whom he is called upon to visit is infected with any communicable disease, such physician shall immediately give notice of such disease to the local health officer, if within the corporate limits of a town or city, or to the county health officer if without the corporate limits of a town or city.

NEBRASKA.

[Compiled Statutes, 1881, 14th ed., 1909.]

Sec. 4403. The State board of health * * * shall collect and preserve such information as may be useful in the discharge of its duties, and for dissemination among the people.

Sec. 4404. It shall be the duty of all boards of health now in existence or that may hereafter be created, and of physicians in localities where there are no health authorities, or where such health authorities fail to act, to report to the State board of health promptly upon the discovery thereof, the existence of any one of the following diseases, viz, Asiatic cholera, yellow fever, smallpox, scarlet fever, diphtheria, typhus and typhoid fever and such other contagious and infectious diseases as the State board of health may from time to time specify; and each and every member of any such board of health, or other officer or physician, who knowing of the existence of any such disease shall fail promptly to report the same in accordance with the provisions of this section, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in any sum not less than ten dollars nor more than one hundred dollars for each and every such offense.

NEW HAMPSHIRE.

[Public Statutes, 1891, ch. 110.]

Sec. 3 (as amended by Acts of 1901, ch. 13). It shall be the duty of every physician who attends upon any person infected with the smallpox, the malignant cholera, diphtheria, scarlet fever, or other malignant pestilential disease, immediately to report the same to the health officers, or in their absence to the selectmen of the town. If any physician shall neglect so to do, he shall be fined one hundred dollars, or be imprisoned not exceeding ninety days, or both.

[Acts of 1901, ch. 16.]

Sec. 2. Whenever any person knows or has reason to believe that any member of his family or household (boarder, roomer, or visitor) has either smallpox, diphtheria, membranous croup, scarlet fever, typhoid fever, measles, or any other malignant communicable disease, he shall, within twenty-four hours, if no physician is in attendance, give notice thereof to the local board of health of the town or city in which he resides, and such notice shall be given either verbally to one of the health officers, or by a communication addressed to the board of health and duly mailed within the time specified.

* * * * * * *

Sec. 5. Upon the appearance of either of the diseases named in section 2 in any town or city in the State, the board of health shall make an immediate report to the State board of health upon blanks furnished for that purpose, and shall thereafter make a weekly report as long as the disease continues, stating number of cases, number of infected houses, fatality, and such other facts as may be required by the State board of health.

[Acts of 1903, ch. 45.]

SEC. 1. It shall be the duty of every physician who attends upon any person whom he suspects is infected with smallpox to immediately report the same to the health officers of the town in which said person then resides, or if there be no health officers, then to the selectmen of the town. * * *

[Acts of 1911, ch. 6.]

SEC. 1. It shall be the duty of every physician practicing medicine or surgery in the State of New Hampshire to report in writing to the State board of health, within one week after the disease is recognized, on forms to be provided by the said board, the name, age, sex, color, occupation, and address of every person under his care in this State who in his opinion is infected with pulmonary or other form of tuberculosis. It shall also be the duty of the officer having charge for the time being of each and every hospital, dispensary, asylum, or other public or private institution in the State to report in like manner the name, age, sex, color, occupation, and last address of every person in his care, or who has come under his observation within one week of such time, who in his opinion is infected with pulmonary or other form of tuberculosis.

* * * * * * *

SEC. 3. The State board of health shall cause all cases showing the presence of tubercle bacilli to be recorded in a register, of which the board shall be the custodian and which shall not be open to inspection, nor shall the board permit any such record to be divulged in any manner to disclose the identity of the person to whom it relates except to a health officer, if deemed necessary, to carry out the provisions of this act.

* * * * * * *

SEC. 5. Upon the recovery of any person who has been found to be infected with tuberculosis a report to that effect shall be made to the State board of health by the attending physician and shall be recorded in the register aforesaid, and shall relieve the said person from further liability to any requirement imposed by this act.

* * * * * * *

SEC. 7. Any person violating the provisions of this act shall, upon conviction thereof, be deemed guilty of a misdemeanor and shall be punished by a fine of ten dollars, or imprisonment for thirty days, or both.

[Acts of 1911, ch. 17.]

SEC. 1. Upon the appearance of smallpox, typhoid fever, or any other dangerous communicable disease in any unincorporated locality in this State it shall be the duty of any person having knowledge thereof immediately to notify the State board of health of the appearance of such disease, provided there is no local board of health having jurisdiction in the locality.

* * * * * * *

SEC. 3. Any person violating the provisions of this act or any regulation established thereunder, shall be fined ten dollars for each offense.

NEW JERSEY.

[General Statutes, 1895, p. 1676.]

SEC. 1. Should one or both eyes of an infant become inflamed, swollen, or reddened, or show any unnatural discharge at any time within two weeks after its birth and no legally qualified practitioner of medicine be in attendance upon the infant at the time, it shall be the duty of the midwife, nurse, attendant, or relative having charge of such infant to report the fact in writing, within 6 hours, to the local board of health of the city, township, or other municipality in which the parents of the infant reside.

[Acts of 1911, ch. 380.]

A supplement to an act entitled "An act for the protection of the public health," approved March twenty-second, one thousand eight hundred and ninety-five.

Sec. 1. Every physician who shall attend any person sick with typhoid fever, dysentery, scarlet fever, diphtheria, or tuberculosis, on any dairy premises where milk is produced for sale or distribution, shall report to the secretary of the State board of health within twelve hours after he first ascertained that any such person is sick with any of said diseases, which report shall be in writing, and shall state the nature of the disease, the name of the person who is ill with said disease, and the location of the place where such person is ill as aforesaid, and the name of the owner or manager of said dairy premises if the same can be ascertained.

Sec. 2. Every physician who shall attend any person sick with any of the diseases mentioned in section one, who shall have knowledge of the fact that any member of the family of such person ill as aforesaid, or any person living in the same family, is employed on any dairy premises where milk is produced for sale or distribution, shall report to the secretary of the State board of health in writing, within twelve hours after he first ascertained that any such person is sick as aforesaid, or within twelve hours after gaining the information above mentioned as aforesaid, which report shall state the name of the person who is ill with said disease, the nature of the disease, and the location of the place where such person is sick as aforesaid, and shall further specify the name of the member of the family of such person or of the person living in the same family as the person ill as aforesaid who is employed on dairy premises as aforesaid, and the name of the owner or manager thereof if the same can be ascertained, and the location of the dairy premises where said person is employed.

Sec. 3. Every person who shall fail to make the report provided for by sections one and two of this act in the manner and within the time therein mentioned, shall, for every such failure, forfeit the sum of fifty dollars, to be recovered in the manner provided for the recovery of penalties in the act to which this act is a supplement.

[Acts of 1911, ch. 381.]

An act to amend an act entitled "An act for the protection of the public health," approved March twenty-second, one thousand eight hundred and ninety-five.

Sec. 1. Section one of the act to which this act is amendatory be, and the same hereby is, amended so that it shall read as follows:

"Sec. 1. Every physician shall, within twelve hours after his first professional attendance upon any person who is suffering from cholera, yellow fever, typhus fever, leprosy, plague, trichinosis, smallpox, varioloid, enteric or typhoid fever, diphtheria, membranous croup, scarlet fever, malaria, tuberculosis in any of its manifestations, trachoma, hydrophobia, glanders, anthrax, chicken-pox, anterior poliomyelitis or infantile paralysis, or any other contagious, infectious, or communicable disease which may hereafter be publicly declared by the State board of health to be preventable and specially dangerous to the public health, report such sickness to the assessor of the township in which such sickness may be; if such sickness be within the limits of the jurisdiction of any local board of health other than the local board of health of any township, then such physician shall report such sickness to the secretary of the local board of health having jurisdiction over the territory within which such sickness may be, if such board has a secretary; if such board has no secretary, then to the clerk of such board; provided, however, that any local board of health may designate some officer of such board, other than the clerk, secretary, or township assessor, to receive such reports, in which case all such reports shall be made to such officer; such report shall be in writing, signed by such physician, and shall set forth the name, age, and precise location of the person suffering from such disease; and every house owner or householder who has reason to believe that any person living, dwelling, or being in any building under his control is affected by any of the contagious, infectious, or communicable diseases hereinabove specified or referred to, shall, when no physician has professionally attended such sick person, within twelve hours after discovering the same, report the fact in writing to the same person and in the same manner as any physician attending such sick person would be required to do as hereinabove set forth; and on the thirtieth day of June and the thirty-first day of December in each and every year every physician, house owner, and householder making any report or reports, as in this section required, shall be entitled to receive from the officer to whom such report or reports shall have been made during the preceding six months, a certificate in writing under the hand of such officer, setting forth the number of names of persons reported to have been affected with any of the diseases hereinabove specifically named or referred to, which certificate when presented by such physician, house owner, or householder to the proper disbursing officer of the city, borough, town, or other local municipal government or township within which such affected person may have been, shall entitle such physician, house owner, or householder to receive from such disbursing officer the sum of ten cents for each and every name by such certificate certified to have been reported, unless such notification shall be found to have been erroneous; and any physician, house owner, or householder who shall fail to perform the above-mentioned duty at the time and in the manner above provided shall be liable to a penalty of fifty dollars for each such failure."

Sec. 2. Section two of the act of which this act is amendatory be, and the same hereby is, amended so that it shall read as follows:

"Sec. 2. That the facts contained in every report filed pursuant to the provisions of the first section of this act shall be entered by the officer to whom the same shall be delivered in a book kept exclusively for that purpose, which book shall be subject to the inspection of the local board of health and its proper officers and to the State board of health and its officers only; the officer to whom such report shall be delivered, and whose duty it is to make record of same, as in this section above set forth, shall also, at least once in each week, and daily when required by the State board of health, transmit the facts stated therein by mail to the secretary of the board of health of the State of New Jersey, at Trenton, and shall upon request by the said State board of health or any of its officers give full information concerning the measures which are employed by the local board of health to prevent the spread of the disease in such reports mentioned, which facts and information shall be conveyed to the secretary of the said State board of health in writing; any officer whose duty it is to make any report to said State board of health or the secretary thereof, as in this section above provided, and who fails to perform such duty at the time and in the manner above provided, shall be liable to a penalty of fifty dollars for each and every such failure of duty. Proof that the secretary of said State board of health has not received the report of such facts or such information from any such officer shall be prima facie evidence that such facts and information have not been transmitted to said secretary by such officer. Every officer whose duty it is to receive the reports mentioned in section one of this act shall, during the month of October in each year, upon presentation of a certificate signed by the secretary of the State board of health stating the whole number of such cases reported as aforesaid from each municipality or township by such officer to the State board of health during the preceding year, be entitled to receive, from the proper disbursing officer of the township, city, borough, town, or other local municipal government within the limits of which the sickness so reported occurred, the sum of ten cents for each case reported, as aforesaid, to the secretary of the State board of health: *Provided, however*, That such officer shall not be entitled to any payment for or on account of any such case unless report of such case was received by the secretary of the said State board of health within ten days after the date such said case was reported to the officer transmitting the same, and no such case shall be included in such certificate unless so received. Such certificates shall be sent to the officers above mentioned during the month of October of each year."

Sec. 3. This act shall take effect immediately.

[Acts of 1910, ch. 169.]

SEC. 1. Tuberculosis is hereby declared to be an infectious and communicable disease, dangerous to the public health. It shall be the duty of every physician in the State of New Jersey to report in writing, signed by him, the name, age, sex, color, occupation, place where last employed, if known, and address of every person known by said physician to have tuberculosis to the local board of health of the city, borough, town, or other municipality in this State in which said person resides, within forty-eight hours after such fact comes to the knowledge of said physician. It shall also be the duty of the chief officer having charge for the time being of any hospital, asylum, prison, or other private or public institution in said State of New Jersey to report in like manner the name, age, sex, color, occupation, place where last employed, if known, and previous address of every patient having tuberculosis who comes into his care or under his observation within forty-eight hours thereafter.

NEW MEXICO.

[Acts of 1903, ch. 103.]

SEC. 19. Whenever any physician or other person shall know that any person is sick with smallpox or other contagious or infectious disease * * * dangerous to the public health, he shall at once give notice thereof, if within the limits of any incorporated city, town, or village, to the health officer for the county in which such city, town, or village is situated; and if not within such city, town, or village, then to the justice of the peace in the precinct in which such disease * * * exists. Whenever such notice is given to any justice of the peace it shall be his duty to at once notify the health officer of the county. Any physician, justice of the peace, or other person failing, neglecting, or refusing to perform any duty imposed upon him by this section shall be guilty of a misdemeanor * * *.

SEC. 20. Whenever any householder shall know that any person in his family is sick with smallpox or other contagious disease dangerous to the public health he shall immediately give notice thereof required by the last preceding section, and upon failure to give such notice shall be deemed guilty of a misdemeanor, and punished upon conviction as in said section provided.

* * * * * * *

NEW YORK.[a]

[Consolidated Laws, 1909, ch. 45.]

SEC. 5. There shall be in the State department of health a bureau of vital statistics for the registration of births, marriages, deaths, and prevalent diseases, which shall be under the general charge and supervision of the commissioner of health. He shall prescribe and prepare the necessary methods and forms for obtaining and preserving such statistics and to insure the prompt and faithful registration of the same in the several municipalities and in the State bureau. * * * If defects exist in any registration under the supervision of a local board of health the commissioner shall notify the local board that such defects must be amended and prevented within 10 days from the date of the notice. If such defects are not so amended or prevented, the commissioner shall take control of such registration and record thereof and enforce the rules and regulations in regard thereto, and secure a complete registration in such municipality, and such control shall continue until the local board satisfies the commissioner that it will make such record and registry complete, as required by law. * * *

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[a] *See also* page 156.

Sec. 12. The commissioner of health shall annually on or before the first Monday in February make a written report to the governor upon the vital statistics and sanitary conditions * * * of the State. * * *

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Sec. 25. * * * Every physician shall immediately give notice of every case of infectious and contagious or communicable disease required by the State department of health to be reported to it, to the health officer of the city, town, or village where such disease occurs; and no physician being in attendance on such case it shall be the duty of the superintendent or other officer of an institution, householder, hotel, or lodging-house keeper, or other person where such case occurs, to give such notice. The physician or other person giving such notice shall be entitled to the sum of twenty-five cents therefor. * * * Every such local board of health shall report to the State department of health, promptly, the facts relating to infectious and contagious or communicable diseases, and every case of smallpox or varioloid within the municipality. Health officers of cities, villages, and towns shall report in writing once a month to the State department of health all cases of such infectious and contagious or communicable diseases as may be required by the State department of health, and for such reporting the health officer of a village or town shall be paid by the municipality employing him * * * a sum not to exceed twenty cents for each case so reported. The reports of cases of tuberculosis made pursuant to the provisions of this section shall not be divulged or made public, so as to disclose the identity of the persons to whom they relate, by any person; except insofar as may be necessary to carry out the provisions of this section. * * * The health officer, commissioner of health, or boards of health of the cities of the first class shall report promptly to the State department of health all cases of smallpox, typhus and yellow fever, and cholera and the facts relating thereto.

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Sec. 127. The health officer shall keep the department of health of the city of New York informed of the number of cases of quarantinable diseases and the character of the same held at quarantine, and he may receive any vessel or merchandise sent to him by the health authorities of New York which in his opinion is dangerous to the public health.

Sec. 129. The quarantinable diseases are yellow fever, plague, cholera, typhus or ship fever, and smallpox, and any other infectious disease which has been or may be determined to be quarantinable by the health officer. * * *

Sec. 320. Tuberculosis is hereby declared to be an infectious and communicable disease, dangerous to the public health. It shall be the duty of every physician in the State of New York to report in writing, on a form to be furnished as hereinafter provided, the name, age, sex, color, occupation, place where last employed, if known, and address, of every person known by said physician to have tuberculosis, to the health officer of the city, town, or village in which said person resides, within twenty-four hours after such fact comes to the knowledge of said physician. It shall also be the duty of the chief officer having charge for the time being of any hospital, dispensary, asylum, or other similar private or public institution in said State of New York to report in like manner the name, age, sex, color, occupation, place where last employed, if known, and previous address of every patient having tuberculosis who comes into his care or under his observation, within twenty-four hours thereafter.

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§ 322. *Protection of records.*—It shall be the duty of every health officer of a city, town, or village to cause all reports made in accordance with the provisions of section three hundred and twenty, and also all results of examinations showing the presence of the bacilli of tuberculosis, made in accordance with the provisions of section three hundred and twenty-one, to be recorded in a register, of which he shall be the custodian. Such register shall not be open to inspection by any person other than the health authorities of the State and of the said city, town, or village, and said health authorities shall not permit any such report or record to be divulged so as to disclose the identity of the person to whom it relates, except as may be necessary to carry into effect the provisions of this article.

§ 329. *Penalty for failure of physician to perform duties or for making false reports.*—Any physician or person practicing as a physician who shall knowingly report as affected with tuberculosis any person who is not so affected, or who shall wilfully make any false statement concerning the name, age, sex, color, occupation, place where last employed if known, or address of any person reported as affected with tuberculosis, or who shall certify falsely as to any of the precautions taken to prevent the spread of infection, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be subject to a fine of not more than one hundred dollars.

§ 330. *Reporting recovery of patient.*—Upon the recovery of any person having tuberculosis, it shall be the duty of the attending physician to make a report of this fact to the local health officer, who shall record the same in the records of his office, and shall relieve said person from further liability to any requirements imposed by this article.

§ 331. *General penalty.*—Any person violating any of the provisions of sections three hundred and twenty to three hundred and thirty, both inclusive, of this article, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished, except as in this article otherwise provided, by a fine of not less than five dollars nor more than fifty dollars.

§ 332. *Application of provisions.*—No portion of sections three hundred and twenty and three hundred and thirty-one, both inclusive, shall apply to the city of New York, nor shall the passage of said sections modify or repeal any of the provisions of the charter of the city of New York, or any rule or regulation issued by the department of health of said New York City.

NORTH CAROLINA.

[Revisal of 1905.]

SEC. 4439. Bulletins of the outbreak of disease dangerous to the public health shall be issued by the State board whenever necessary, and such advice freely disseminated to prevent and check the invasion of disease into any part of the State.

* * *

[Acts of 1911, ch. 62.]

SEC. 16. All laws pertaining to the reporting, recording * * * of the diseases mentioned in section eighteen, * * * shall be faithfully enforced by the quarantine officer. * * *

SEC. 17. If a householder knows that a person within his family is sick with smallpox, diphtheria, scarlet fever, measles, whooping cough, yellow fever, typhus fever, cholera, or bubonic plague he shall immediately give notice thereof to the quarantine officer or the deputy quarantine officer.

SEC. 18. If a physician suspects that a person whom he is called to visit is infected with smallpox, diphtheria, measles, whooping cough, scarlet fever, typhus fever, yellow fever, cholera, or bubonic plague * * * he shall immediately give notice thereof to the quarantine officer or deputy quarantine officer.

SEC. 19. The quarantine officer shall record on duplicate forms supplied by the State board of health and in accordance with instructions furnished therewith, all diseases reported in pursuance of sections eighteen and nineteen. The said officer receiving notice of the diseases named in sections eighteen and nineteen shall make the following report: First, the quarantine officer shall notify the secretary of the State board of health, by telegram, within twenty-fours after receiving information of the presence of yellow fever, cholera, typhus fever, or bubonic plague, of the existence of every case of the aforesaid diseases; second, the quarantine officer shall notify the teacher or principle in the school attended by members of the family of the sick child, on blank forms furnished by the State board of health, within twenty-four hours after receiving information of the presence of yellow fever, cholera, typhus fever, bubonic plague, diphtheria, scarlet fever, measles, or whooping cough, of the existence of every case of the said diseases; third, the quarantine officer shall mail to the secretary of the State board of health, not later than the fifth day of the following month, the original record of all cases of yellow fever, smallpox, measles, cholera, typhus fever, bubonic plague, diphtheria, scarlet fever, and whooping cough, for the preceding month: *Provided*, That the quarantine officers are hereby empowered to appoint, if they desire, one deputy quarantine officer in each township of the county; the tenure of office of such deputy shall be terminable at the pleasure of the quarantine officer. The deputy quarantine officer, upon receiving notice of the existence of any of the diseases mentioned in sections eighteen and nineteen, shall at once notify the quarantine officer, upon suitable blank forms supplied him for this purpose. * * * The quarantine officer shall be liable for the neglect or refusal of his deputy to carry out the provisions of this act. Any householder, physician, quarantine officer, or any other person who violates the provisions of this section shall be guilty of a misdemeanor, and upon conviction thereof shall be liable to a fine of not less than ten dollars nor more than fifty dollars, or imprisonment for not less than ten nor more than thirty days, and shall be liable to a penalty of twenty-five dollars in favor of any person who shall sue for the same. The chairman of the board of county commissioners shall be responsible for the enforcement of sections eighteen, nineteen, * * * of this act in his jurisdiction. Failure on his part to enforce its provisions shall be a misdemeanor, and he shall be liable to a fine of not less than ten dollars nor more than fifty dollars. * * *

Sec. 21. The county, town, or city treasurer, as the case may be, shall pay twenty-five cents each, or more if necessary, for the execution of this act, to the quarantine officer upon presentation of a certified statement from the secretary of the State board of health of the number of cases of the diseases mentioned in section nineteen reported to the said secretary for the preceding month. * * *

NORTH DAKOTA.

[Revised Codes of 1905.]

Sec. 257. The superintendent of public health shall on the first day of December of each even numbered year make a full report to the governor, which report shall show * * * the character and extension during such time of all contagious and infectious diseases that have been reported to him * * *

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Sec. 260. * * * The county superintendent of health shall * * * whenever any contagious or infectious disease occurs in his county, either among persons or domestic animals, immediately report the same to the superintendent of public health.

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Sec. 275. Whenever it shall come to the knowledge of any physician or other person that a contagious, epidemic, or infectious disease exists within the jurisdiction of any local board, he shall immediately report to such board in writing the name and place of residence, if known, of every person afflicted with such disease, and if he is the attending physician of such person he shall report not less than twice in each week the condition of each person so afflicted and the state of such disease.

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Sec. 277. Each keeper of any private house, boarding house, lodging house, inn, or hotel shall report in writing to the local board of health within whose jurisdiction the same may occur each case of contagious, infectious, or epidemic disease which may occur in his house, inn, or hotel; such report shall be made within twenty-four hours after the existence of such disease shall become known to such person, and shall state the name of each person afflicted with such disease and the nature thereof.

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Sec. 282. * * * Whenever it shall come to its knowledge that a case of smallpox, scarlet fever, diphtheria, or other infectious or contagious disease exists within its jurisdiction, * * * the local board of health shall * * * immediately notify the State board of health of the existence and nature of such disease. * * *

Sec. 288. The health officer of each city, the clerk of each civil township, and in counties not organized into civil townships, the county commissioner of such county for the district for which he was elected, and the superintendent of the county board of health of each county in the State, shall obtain and register the following facts concerning the * * * contagious and infectious diseases occurring therein, separately numbering and recording the same in the order in which he obtains them, designating in separate columns, viz, * * *; in the registry of infectious and contagious diseases, the name of the person affected, the sex, color, and age of the person, the nature of the disease, and the date of record. The county auditor of each county shall furnish each officer within his county, charged with the duties herein provided, at the expense of the county, a book in which to register the facts concerning * * * infectious and contagious diseases as herein provided. The superintendent of each county board of health shall keep his records in the office of the county judge of said county.

Sec. 289. Where no physician is employed, it shall be the duty of the parents to give notice to the proper office within whose jurisdiction they reside, * * * of the presence of any infectious or contagious disease occurring within their household, within twenty-four hours, * * * and the oldest person next of kin, the keeper or other proper officer of every workhouse, poorhouse, reform school, jail, prison, hospital, asylum, or other public or charitable institution, shall give like notice of any * * * infectious or contagious disease occurring among the persons under his charge. * * *

Sec. 290. * * * Any physician attending a case of infectious or contagious disease shall immediately notify the health officer within whose jurisdiction such disease exists, giving the name of patient, place of residence, and the character of the disease, and shall in addition thereto, for the purpose of keeping the record of vital statistics complete, certify the facts to the clerk of the civil township within whose district such disease occurred, or in counties not organized into civil townships then to the county commissioner having the proper jurisdiction, giving the name of the patient, place of residence, and character of the disease. * * *

Sec. 291. It shall be the duty of the health officer of each city and the clerk of each organized civil township of each county in this State, and in counties not organized into civil townships, the county commissioner of such county for the district for which he was elected, to make and send a copy of the registry of * * * infectious and contagious diseases to the superintendent of the county board of health of each county in the State not later than the 10th of each month a certified copy of the registry of * * * infectious or contagious diseases occurring within the preceding month; and the superintendent of the county board of health of each county in this State shall make and send to the State superintendent of health on or before the fifteenth day of each month a copy of the records showing all * * * infectious or contagious diseases reported to him for the preceding month within his county. * * *

Sec. 292. The superintendent of each county board of health shall, on or before the fifteenth day of each month, transmit to the superintendent of the State board of health, upon blanks furnished him by the State board of health, a certified copy of the registry of * * * infectious and contagious diseases which have occurred in said county within the calendar month immediately preceding, as reported to him by the officers charged with the collection of vital statistics within his county. For obtaining, registering, and returning the facts herein required the county superintendent of health shall receive a sum of ten cents for each separate record of * * * infectious and contagious diseases so made and reported, to be paid out of the general fund of such county in the same manner as other bills and accounts against said county are allowed and paid. For neglect to perform such duties as are herein required the county superintendent of health shall forfeit a sum not exceeding fifty dollars for each offense, to be collected as other fines are collected by law.

[Acts of 1911, ch. 188.]

Sec. 3. Should one or both eyes of an infant become inflamed, swollen, or reddened or show any unnatural discharge or secretion at any time within two weeks after its birth, and no legally qualified physician is in attendance upon the infant at that time, it shall be the duty of its parents or, in their absence, whoever is caring for said infant, to report the fact in writing within six hours after discovery to the health officer having jurisdiction: *Provided*, Said report to said health officer need not be made from recognized hospitals.

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Sec. 5. Penalty.—Any violation of the provisions of this act shall be punished by a fine of not less than ten dollars nor more than fifty dollars.

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OHIO.

[General Code, 1910.]

Sec. 1243. Boards of health, health authorities or officials, and physicians in localities where there are no health authorities or officials shall report to the State board of health promptly upon the discovery thereof the existence of any one of the following diseases: Asiatic cholera, yellow fever, smallpox, scarlet fever, diphtheria, membranous croup, typhus or typhoid fever, and such other contagious or infectious diseases as the State board specifies.

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Sec. 4427. Each physician or other person called to attend a person suffering from smallpox, cholera, plague, yellow fever, typhus fever, diphtheria, membraneous croup, scarlet fever, or typhoid fever, or any other disease dangerous to the public health, or required by the State board of health to be reported, shall report to the health officer within whose jurisdiction such person is found, the name, age, sex, and color of the patient, and the house and place in which such person may be found. In like manner, the owner or agent of the owner of a building in which a person resides who has any of the diseases herein named or provided against, or in which are the remains of a person having died of any such disease, and the head of the family, immediately after becoming aware of the fact, shall give notice thereof to the health officer.

Sec. 4428. When complaint is made or a reasonable belief exists that an infectious or contagious disease prevails in a house or other locality which has not been so reported the board shall cause such house or locality to be inspected by its health officer, * * *

Sec. 12787. Whoever, being a midwife, nurse, or relative in charge of an infant less than ten days old, fails within six hours after the appearance thereof to report in writing to the physician in attendance upon the family, or if there be no such physician to a health officer of the city, village, or township in which such infant is living, or, in in case there be no such officer, to a practitioner of medicine legally qualified to practice, that such infant's eye is inflamed or swollen or shows an unnatural discharge, if that be the fact, shall be fined not less than five dollars nor more than one hundred dollars or imprisoned not less than thirty days nor more than six months, or both.

OKLAHOMA.

[Snyder's Compiled Laws, 1909.]

SEC. 349. It shall be the duty of all practicing physicians in each county to make a report to the county superintendent of public health for said county, upon forms as prescribed and furnished by the State board of health, of all the cases of infectious and contagious diseases. Such report shall be made by said physician as soon as the disease is discovered, and upon failure on the part of the physician to so report said disease as herein provided, he shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in a sum not less than ten dollars and not more than twenty-five dollars. * * *

SEC. 350. It shall be the duty of any practicing physician in cities of the first class, in counties of this State, to make a report to the city superintendent of public health, upon forms prescribed and furnished by the State board of health, of all cases of infectious and contagious diseases, as soon as discovered by him or coming to his knowledge. Any failure upon the part of said physician to report said disease as herein provided, shall be deemed guilty of misdemeanor, and upon conviction thereof, shall be fined in the sum of not less than twenty-five dollars nor more than one hundred dollars. * * * It shall be the duty of said city superintendent of public health to make a full report from time to time to the State board of health as to all cases of contagious and infectious diseases existing within said city at such times and under such rules and regulations that said State board of health may require. * * *

OREGON.

[Acts of 1903, p. 82.]

SEC. 8. * * * It shall be the duty of the county board of health * * * to report to the secretary of the State board of health monthly, not later than the tenth day, all infectious diseases, * * * that may have been reported to said board of health during the preceding month, excepting cities wherein vital statistics are collected, and in such cases the health officer, or other persons whose duty it is to collect said statistics, must send to the secretary of the State board of health, not later than the tenth day of the month, a transcript of his monthly records of deaths * * * and all infectious diseases reported to him.

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SEC. 12. * * * Every physician, or other person, under whose charge any infectious or epidemic disease occurs, must report the same to the county or city health officer immediately. * * *

PENNSYLVANIA.

[Purdon's Digest, 13th ed., p. 1886,]

78. Should one or both eyes of an infant become inflamed, or swollen and reddened, at any time within two weeks after birth, it shall be the duty of the midwife or nurse or other person having the care of such infant, to report in writing within six hours after the discovery thereof to the health officer, or legally qualified practitioner of the city, town, or district in which the mother of the child resides, the fact that such inflammation, or swelling, or redness exists.

[Acts of 1909, ch. 658.]

SEC. 1. Every physician, practicing in any portion of this Commonwealth, who shall treat or examine any person suffering from, or afflicted with, actinomycosis, anthrax, bubonic plague, cerebrospinal meningitis (epidemic), (cerebrospinal fever, spotted fever), chicken pox, Asiatic cholera, diphtheria (diphtheritic croup, membranous croup, putrid sore throat), epidemic dysentery, erysipelas, German measles, glanders (farcy), rabies (hydrophobia), leprosy, malarial fever, measles, mumps, pneumonia (true), puerperal fever, relapsing fever, scarlet fever (scarlatina, scarlet rash), smallpox (variola, varioloid), tetanus, trachoma, trichiniasis, tuberculosis in any form, typhoid fever, typhus fever, whooping cough, or yellow fever, shall, if said case shall be located in a township of the first class, a borough, or a city, forthwith make a report in writing to the health authorities of said township, city, or borough; and, if said case shall be located in a township of the second class, or a city, borough, or township of the first class not having a board of health or body acting as such, to the State department of health, upon blanks supplied for that purpose; in which report he shall, over his or her own signature, state the name of the disease, and the name, age, sex, color, nativity, and occupation, if any, of the person suffering therefrom, together with the street and house number of the premises in which said person may be located, or otherwise sufficiently designate the same, the date of the onset of the disease, the name and occupation of the householder in whose family the disease may have occurred, the number of children in said household attending school, and the name or names of the school or schools so attended, together with such other information relating so said case as may be required by said health authorities and the State department of health.

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Sec. 9. Blanks whereon to make the reports * * * required by this act shall be supplied in cities, boroughs, and townships of the first class by the health authorities thereof, respectively; and in townships of the second class, and in cities, boroughs, and townships of the first class not having boards of health or bodies acting as such, by the State department of health.

Sec. 10. It shall be the duty of the health authorities of cities, boroughs, and townships of the first class, respectively, to furnish daily, by mail or otherwise, to principals, superintendents, teachers, and other persons in charge of public, private, parochial, Sunday, and other schools, a printed or written bulletin containing the name, location, and disease of all persons suffering from any of the diseases mentioned in sections three, four, five, six, and seven of this act, upon receipt by them of reports of such cases from physicians, as required by section one of this act; and such bulletin shall be daily furnished to such persons in charge of such schools in townships of the second class, and in cities, boroughs, and townships of the first class, not having boards of health or bodies acting as such, by the State department of health.

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Sec. 23. The health authorities of the several cities, boroughs, and townships of the first class shall, at the end of each week and for the fraction of each week occurring at the end of each month, report to the State department of health, upon blanks supplied for that purpose, a list of all cases of communicable diseases mentioned in section one of this act which have been reported to them during said period, which report shall contain the name of each person suffering therefrom, respectively, and his or her age, sex, color, and nativity, together with the name of the disease and the date of the onset thereof; and in the event of no reports of any of said diseases having been received by the aforesaid health authorities, respectively, during any said period, that fact shall be reported to the State department of health. All superintendents and other persons in charge of asylums, hospitals, or other institutions located in townships of the second class shall at the end of each week and portion of a week occurring at the end of each month report to the State Department of health on blanks to be supplied for that purpose, a list of the inmates of such institutions, respectively, who may have suffered from any of the diseases enumerated in section one of this act, together with the above-mentioned data relative to each inmate, with the date of his or her admission to the institution, and the name of the city, borough, or township from which he or she was admitted.

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Sec. 24. * * * Any physician, * * * or any other person or persons, who shall fail, neglect, or refuse to comply with, or who shall violate any of the provisions of this act shall, for every such offense, upon conviction thereof in a summary proceeding before any magistrate or justice of the peace of the county wherein said offense was committed, be sentenced to pay a fine of not less than twenty ($20) dollars or more than one hundred ($100) dollars, to be paid to the use of said county, or to be imprisoned in the county jail for a period of not less than ten nor more than thirty days, or both, at the discretion of the court.

PORTO RICO.

[Laws of 1911, act 68.]

Sec. 25. * * * Physicians shall report to the nearest health officer any of the following diseases: Exanthematic typhus, typhoid fever, smallpox, varioloid, scarlet fever, diphtheria, yellow fever, Asiatic cholera, bubonic plague, beriberi, epidemic dysentery, cerebro-spinal meningitis, whooping cough, epidemic parotiditis, malaria, tuberculosis, glanders, leprosy, cutaneous syphilis, and hookworm disease, or uncinariasis.

Sec. 26. It shall be the duty of practicing physicians to report to the local health officer all cases of infectious or contagious diseases treated by them, and it shall be the duty of health officers to immediately report all such cases to the director of sanitation. It shall be likewise the duty of veterinarians to report to the director of sanitation any disease of the animals under their care, such as bacteroid carbuncle, tuberculosis, actinomycosis, gangrenous septicaemia, glanders, or any other epidemic disease.

RHODE ISLAND.

[General Laws, 1909, ch. 96.]

Sec. 10 (added by acts of 1909–10, ch. 386). It shall be the duty of the State board of health to keep a register of all persons in this State who are known to be affected with laryngeal or pulmonary tuberculosis. The State board of health shall have sole exclusive control of said register and shall not permit the inspection thereof nor disclose any of its personal particulars except to officials authorized under the laws of this State to receive such information.

Sec. 11 (added by acts of 1909–10, ch. 386). The superintendent, or other person, in charge or control of any hospital, school, reformatory, or other institution, deriving the whole or any part of its support from the public funds of the State of Rhode Island, having in charge or under his care and custody any person or persons suffering with pulmonary or laryngeal tuberculosis, shall, within forty-eight hours after recognition of such disease, make, or cause to be made, in the manner and form prescribed by the State board of health, a record of the name, age, sex, color, occupation, social condition, and residence of the person or persons so affected, together with such other information as may be determined by the State board of health. Said information to be furnished on blanks supplied by the State board of health, and said information shall be forwarded each week to the office of the secretary of the State board of health on said blanks. * * *

Sec. 12 (added by acts of 1909–10, ch. 386). Whenever any physician knows that any person under his professional care is affected with pulmonary or laryngeal tuberculosis, he shall transmit to the secretary of the said State board of health within seven days, and upon blanks provided by the State board of health for that purpose, the name, sex, age, color, occupation, social condition, and residence of such person. * * *

[General Laws, 1909, ch. 110.]

SEC. 13. Every householder or person shall immediately inform the town council of the town wherein he dwells, of any person in the house or tenement occupied by him, who has been taken sick of the smallpox, or any other contagious or infectious distemper, or suspected to be so.

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SEC. 19. Every physician, householder, or other person, having knowledge of the existence of smallpox in any town, shall immediately give information thereof to the town clerk of the town in which the person is sick with the smallpox, and in cities shall give like information to the superintendent of health.

SEC. 20. Whenever the town clerk of any town shall have knowledge or shall have received information as provided in the preceding section of the existence of smallpox in his town, he shall forthwith give or cause notice thereof to be given to the town council of such town, at the expense of the town, to be audited and allowed by the town council.

[General Laws of 1909 (ch. 343).]

SEC. 25. Should any midwife or nurse, or person acting as nurse, having charge of an infant in this State, notice that one or both eyes of such infant are inflamed or reddened at any time within two weeks after its birth, it shall be the duty of such midwife or nurse, or person acting as nurse, so having charge of such infant, to report the fact in writing within six hours to the health officer, or some qualified practitioner of medicine, of the city or town in which the parents of the infant reside.

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SEC. 27. Every person who shall fail to comply with the provisions of the two sections next preceding shall be fined not exceeding one hundred dollars, or imprisoned not exceeding six months, or both.

[Acts of 1911, ch. 728.]

SECTION 1. Any physician who may discover a case or cases of anterior poliomyelitis, tubercular meningitis, or cerebrospinal meningitis shall immediately report the existence of each and every case of said diseases to the secretary of the State board of health, together with such information as said secretary may require.

SOUTH CAROLINA.

[Criminal Code, 1902.]

SEC. 331. Should one or both eyes of an infant become reddened or inflamed at any time after birth, it shall be the duty of the midwife or nurse or person having charge of said infant to report the condition of the eyes at once to the local board of health of the city or town in which the parents of the infant reside.

Any failure to comply with the provisions of this section shall be punishable by a fine not to exceed twenty-five dollars or imprisonment not to exceed one month, or both.

This section shall not apply to towns or cities of less than one thousand inhabitants.

[Act No. 395, 1910.]

SEC. 1. In all cases of known or suspected contagious or infectious diseases occurring within any incorporated city or town of this State, it shall be the duty of the attending physician to report such disease to the secretary of the board of health of each city or town within twenty-four hours, stating the name and address of the patient, and the nature of the disease.

SEC. 2. It shall be the duty of the secretary of each local board of health to report to the secretary of the State board of health all such cases of infectious and contagious diseases as have been reported to him during the preceding months, such reports to be made upon blanks furnished by the State board of health, and not later than the fifth day of each month.

Sec. 3. It shall be the duty of the attending physician in all cases of known or suspected contagious or infectious diseases outside of incorporated cities and towns, to report such cases to the secretary of the State board of health within twenty-four hours after they have come under his observation, said reports to be made upon blanks furnished by the State board of health.

Sec. 4. The State board of health is hereby authorized to name the diseases it considers contagious and infectious.

Sec. 5. Any physician or secretary of a local board of health, failing to comply with the provisions of this act, shall be deemed guilty of a misdemeanor, and upon conviction shall be fined in a sum not less than five dollars nor more than twenty-five dollars, or be imprisoned in the county jail for a period not exceeding thirty days.

SOUTH DAKOTA.

[Political Code, 1903.]

Sec. 248. * * * The superintendent of the county board of health shall be ex-officio secretary of the board of health of his county, * * * and shall at the end of every month make a full report in writing to the superintendent of the State board of health * * * of the condition of the public health, and whenever any contagious or infectious disease occurs in his county shall immediately report the same to the superintendent of the State board of health.

* * * * * * *

Sec. 253 * * * Any practicing physician or other person who shall fail to report to the superintendent of the county board of health the existence of any contagious or infectious disease, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than one hundred dollars, or by imprisonment in the county jail for not more than six months, or by both such fine and imprisonment, in the discretion of the court.

TENNESSEE.

[Acts of 1905, ch. 519.]

Sec. 1. Whenever any case of smallpox, yellow fever, cholera, bubonic plague, typhus fever, diphtheria, membranous croup, scarlet fever, or other communicable diseases exist (except it shall not embrace any venereal disease, such as gonorrhea or syphilis), or is even suspected to exist in any household, it shall be the duty of the head of said household, or any other person in such household possessing knowledge of said facts, to immediately notify the municipal or county health authorities of the town or county wherein such disease or diseases exist or may be supposed to exist.

Sec. 2. Whenever any physician, surgeon, or practitioner of medicine shall know or suspect that any person or persons, whom they have been called to visit, or who has been brought to them for examination, or any other suspicious information received relative thereto, is or are infected, or even suspected, with any of the aforementioned diseases, he shall, and it shall be his duty to, immediately notify the health authorities of the town or county in which said diseased person or persons are found.

* * * * * * *

Sec. 11. It shall be the duty of each and every municipal or county board of health in this State, upon receiving information of the existence or suspected existence in their respective jurisdiction of any case of smallpox, cholera, yellow fever, scarlet fever, diphtheria, or other disease dangerous to the public health, to immediately notify the State board of health of the fact, and, in addition, on the first of each and every month make a written report and forward the same without delay to said board of all communicable diseases occurring in their respective jurisdictions for the last month preceding, setting forth in said report in separate columns the age, color, and sex of the individual, name of each disease, number of cases, number of deaths, together with such other information as said State board of health may desire.

[Acts of 1911, ch. 10.]

Section 1. Be it enacted by the General Assembly of the State of Tennessee, that a person who, being a midwife, nurse, or other person having the care of an infant within the age of 2 weeks, neglects or omits to report immediately to the health officers or to a legally qualified practitioner of medicine of the city, town, or place where such child is being cared for, the fact that one or both eyes of such infant are inflamed or reddened whenever such shall be the case, or who applies any remedy therefor without the advice or except by the direction of such officer or physician, or neglects, refuses, or omits to comply with the above requirements shall be guilty of a misdemeanor.

TEXAS.

[Acts of 1911, ch. 95.]

Rule 1.—Every physician in the State of Texas shall report in writing or by an acknowledged telephone communication to the local health authority immediately after his or her first professional visit, each patient he or she shall have or suspect of suffering with any contagious disease, and if such disease is of a pestilential nature he shall notify the president of the State board of health at Austin by telegraph or telephone at State expense. * * *

Rule 2.—For the purpose of these regulations the phrase "local health authority" shall be held to designate the city or county health officer, or local board of health, within their respective jurisdictions.

Rule 3.—The phrase "contagious disease" as used in these regulations shall be held to include the following diseases, whether contagious or infectious, and as such shall be reported to all local health authorities and by said authorities reported in turn to the president of the State board of health: Asiatic cholera, bubonic plague, typhus fever, yellow fever, smallpox, scarlet fever (scarlatina), diphtheria (membranous croup), epidemic cerebrospinal meningitis, dengue, typhoid fever, epidemic dysentery, trachoma, tuberculosis, and anthrax.

Rule 4.—City and county health authorities shall keep a careful and accurate record of all cases of contagious diseases as reported to them, with the date, name, age, sex, race, location, and such other necessary data as may be prescribed by the State board of health. And they shall also make a monthly report of all contagious diseases, of which they may be cognizant, to the president of the State board of health before the fifth of the following month upon blank forms provided by the State board of health. The reports on tuberculosis are to be privately kept and are to be considered in the light of a confidential communication, not for the purpose of isolation, but with the object of education in sanitary precautions and to supply literature of the State board of health.

* * * * * * *

Rule 22. Whenever any nurse, midwife, or other person not a legally qualified practitioner of medicine shall notice inflammation of the eyes or redness of the lids in a newborn child under his or her care, it shall be the duty of such person to report the same to the local health authority, or in his absence any reputable physician, within twelve hours of the time the disease is first noticed.

Rule 23.—Every hotel proprietor, keeper of a boarding house, or inn, and householder or head of family in a house wherein any case of reportable contagious disease (including tuberculosis) may occur shall report the same to the local health authority within twelve hours of the time of his or her first knowledge of the nature of such disease unless previous notice has been given by the physician in attendance. * * *

* * * * * * *

Any person who shall violate any of the rules, regulations, or provisions of the sanitary code of Texas, as herein set forth, shall be deemed guilty of a misdemeanor, and upon conviction shall be fined in any sum not less than ten dollars and not more than one thousand dollars.

UTAH.

[Compiled Laws, 1907.]

SEC. 1108. Every local board of health or health officer shall report to the secretary of the State board of health at such times as the State board may require. * * * It shall be the duty of the local health officer to make a monthly report to the State board of health, on or before the fifth day of each month, of all cases of scarlet fever, smallpox, diphtheria, membranous croup, typhoid fever, whooping cough, measles, chicken pox, pneumonia, and tuberculosis which have occurred within his jurisdiction during the previous month; and upon receipt of the notification of the existence of any case of either of said diseases in any family, a member of which is in attendance upon any public or private school, he must at once report the existence of such disease to the principal of the school so attended. * * *

* * * * * * *

SEC. 1111. All physicians or other persons having knowledge of the existence of any contagious or infectious disease, or having reason to believe that any such disease exists, are hereby required to report the same forthwith to the local board of health.

* * * * * * *

1113x11 (as amended by laws of 1911, ch. 75, sec. 1). It shall be the duty of every physician or other person caring for the sick in the State of Utah, to make a report to the local board of health immediately after such person becomes aware of the existence of any case of scarlet fever, diphtheria, membranous croup, whooping cough, smallpox, typhoid fever, measles, tuberculosis, Asiatic cholera, rubella (rotheln), chicken pox, typhus fever, plague, cerebro spinal meningitis, infantile paralysis, leprosy, or pneumonia, in his or her charge, and it shall be the duty of every person, owner, agent, manager, principal, or superintendent of any public or private institution, or dispensary, hotel, boarding house, or lodging house to make a report in like manner of any inmate, occupant, or boarder, suffering from any of the said infectious or contagious diseases; and in case such physician or other person shall fail to report in twenty-four hours, said person shall be deemed guilty of a misdemeanor.

SEC. 1113x27. It shall be the duty of every physician in the State, every superintendent of hospital or public institution in the State, to immediately report to the State board of health every case of tuberculosis which he is called upon to treat or which is in such hospital or public institution; each and every physician or superintendent shall make such reports as may be called for by the rules and regulations of the State board of health, and must comply with all rules and regulations made by said board to prevent the spread of such disease.

Any person violating any provision of this act shall be guilty of a misdemeanor.

[Acts of 1911, ch. 61.]

SECTION 1. It shall be the duty of every physician and every midwife attending a case of childbirth to report to the local board of health every case where the newly born child has inflammation of the eyes attended by a discharge therefrom. Such report to be made within six hours after the appearance of such disease. It shall be the duty of such physician or midwife to treat the eyes of the child so affected in accordance with the rules of the State board of health. Every physician and midwife failing to comply with the provisions of this act shall be guilty of a misdemeanor.

[Laws of 1911, ch. 90.]

SECTION 1. *Physicians and superintendents of hospitals to report cases.*—It shall be the duty of every physician in this State, every superintendent or manager of a hospital or public institution in this State, to immediately report to the local board of health, every case of venereal disease, which he is called upon to treat or which is in such hospital or public institution, and each and every physician, superintendent or manager of such hospital or institution shall make such reports as may be called for by the rules and regulations of the State boards of health of this State and must comply with all the rules and regulations made by said boards to prevent the spread of venereal diseases: *Provided*, That the report of such venereal disease shall not include the name of the person affected.

SEC. 2. *Rules and regulations.*—It shall be the duty of all boards of health to enact and enforce rules and regulations necessary to prevent the spread of venereal diseases.

SEC. 3. *Penalty.*—Any person violating any of the provisions of this act shall be guilty of a misdemeanor.

VERMONT.

[Public Statutes, 1906.]

SEC. 5446. The State board of health shall have power to designate a health officer of a town adjoining an unorganized town or gore as the health officer of such unorganized town or gore; and said health officer shall report to the secretary of said board every case of contagious disease mentioned in this chapter of which he has information or knowledge as existing in such unorganized town or gore. * * *

SEC. 5447. The head of a family in such unorganized town or gore in whose home there occurs a case of infectious or contagious disease dangerous to the public health shall immediately give notice to said health officer. A physician who knows or suspects that a person in such unorganized town or gore whom he has been called to attend is sick or has died of a communicable disease dangerous to the public health shall at once quarantine and report to said health officer the place where such cause exists, the name, degree of virulence, and cause or source of the disease. * * * The head of a family or a physician who fails to give reasonable notice to said health officer of the existence of such a disease shall be fined not more than fifty dollars nor less than ten dollars, with costs of prosecution.

* * * * * * *

SEC. 5450. A physician who is consulted by a person subject to tuberculosis shall submit the name and address of such person to the secretary of the State board of health upon such blanks as it may furnish. * * *

* * * * * * *

SEC. 5453. Each health officer shall report to the secretary of the State board of health, immediately after receiving information or knowledge thereof, every case of smallpox, varioloid, Asiatic cholera, typhus fever, or yellow fever within the jurisdiction of such local board. * * *

SEC. 5454. The head of a family in whose home there occurs a case of infectious or contagious disease dangerous to the public health shall immediately give notice thereof to the local health officer of the town in which he lives. A physician who knows or suspects that a person whom he has been called to attend is sick or has died of a communicable disease dangerous to the public health shall immediately quarantine and report to the health officer the place where such case exists, and the name, degree of virulence, and cause or source of the disease. * * *

SEC. 5455 (as amended by acts of 1910–11, ch. 217). A health officer shall, upon receiving notice of a case of infectious or contagious disease dangerous to the public health, investigate and ascertain, if possible, the source or cause of the disease, * * * and immediately report the facts to the secretary of the State board of health. When a communicable disease prevails or becomes epidemic, said health officer shall make weekly reports concerning such disease or diseases to the secretary of the State board of health. * * *

VIRGINIA.

[Pollard's Code of 1904.]

Sec. 1713d. * * *.

* * * * * * *

11. The State board of health may require any local board of health to furnish periodically to said State board such facts connected with vital statistics in its city, county, or town as said State board of health may prescribe.

12. The State board of health shall annually, on or before the first day of January in each year, make a written report to the governor upon the vital statistics and sanitary conditions and prospects of the State. * * *

[Acts, 1910, ch. 307.]

1. Every physician practicing in this Commonwealth who shall know or suspect that any person whom he or she is called upon to visit, or who comes to him or her for examination or treatment, is suffering from any infectious, contagious, communicable or dangerous disease shall make report in writing, on blanks to be furnished for that purpose by the State board of health, to the executive officer of the board of health of the county, town, or city in which such person may be located, over his or her own signature, stating the name of the disease, and the name, color, sex, and age of the person suffering therefrom, together with the street and number or such other sufficient designation of the house, room, or other place in which said person may be located, and such other information as may be deemed necessary by said health authorities.

2. The State board of health is hereby authorized to prepare and promulgate from time to time a list of diseases considered as infectious, contagious, communicable, or dangerous within the meaning of this act, and to prescribe the manner and time of the report called for by the preceding section.

3. For failure to comply with the provisions of this act the physician so failing shall be fined not less than one nor more than five dollars for each offense.

[Acts of 1910, ch. 340.]

Sec. 7. It shall be the duty of the local authorities of the cities, towns, and counties of the State to report weekly to the State board of health all cases of infectious, contagious, communicable, or dangerous diseases which have occurred under their jurisdiction, except that it shall be their duty to report immediately any case or cases of smallpox, yellow fever, cholera, typhus fever, or bubonic plague that may occur within their jurisdiction. * * *

WASHINGTON.

[Remington & Ballinger's Annotated Codes and Statutes, 1910.]

Sec. 5407. It shall be the duty of the local board of health, health authorities, or officials, and of physicians in localities where there are no local health authorities or officials, to report to the State board of health, promptly upon discovery thereof, the existence of any one of the following diseases which may come under their observation, to wit: Asiatic cholera, yellow fever, smallpox, scarlet fever, diphtheria, typhus, typhoid fever, bubonic plague or leprosy, and of such other contagious or infectious diseases as the State board may from time to time specify. * * *

Sec. 5536. It shall be the duty of every health officer appointed under the provisions of this chapter, or by the provisions of special charters, upon the appearance of smallpox, diphtheria, scarlet fever, Asiatic cholera, or dangerous contagious disease in the town or city under his supervision, * * * to make full report thereof to the board of health of which he is an executive officer, and also to the State board of health. * * * The term "dangerous contagious disease" as used in this chapter shall be construed and understood to mean such diseases as the State board of health shall designate as contagious and dangerous to the public health. * * *

Sec. 5540. It shall be the duty of every health officer appointed under the provisions of this chapter * * * to report to the State board of health any information he may receive of any case of smallpox, cholera, yellow fever, or typhus fever within three days after receiving any notification or information of the existence of such disease; and any health officer * * * who shall fail or neglect to comply with the provisions of this section shall be liable to a penalty of not less than ten dollars nor more than one hundred dollars for each day of such neglect or refusal to comply with the provisions of this section.

Sec. 5544. * * * All city health officers except those of cities of the first class shall report immediately to the State board of health every new outbreak of any contagious or infectious disease and shall make weekly reports to the county health officer of all contagious or infectious diseases occurring within the city.

It shall be the duty of all health officers, upon the appearance of any dangerous, contagious, or infectious diseases within their jurisdiction, * * * to make a full report thereof, as required above. * * *

Sec. 5545. Whenever any physician shall attend any person sick with any dangerous, contagious, or infectious disease, or with any diseases required by the State board of health to be reported, he shall, within twenty-four hours, give notice thereof to the health officer within whose jurisdiction such sick person may then be.

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Sec. 5547. The term "dangerous, contagious, or infectious disease," as used in this chapter shall be construed and understood to mean such disease or diseases as the State board of health shall designate as contagious or infectious and dangerous to the public health.

Sec. 5548. Any health officer who shall refuse or neglect * * * to make prompt and accurate reports to the county health officer or to the State board of health may be removed as health officer by the State board of health, and shall not again be reappointed except with the consent of the State board of health.

* * * Any physician who shall refuse or neglect to report to the proper health officer within twelve hours after first attending any case of contagious or infectious disease or any disease required by the State board of health to be reported, or any case suspicious of being one of such diseases, shall be guilty of a misdemeanor, and upon conviction shall be fined not less than ten dollars nor more than two hundred dollars for each case that is not reported.

* * * * * * *

Sec. 5550. All practicing physicians in cities of the first and second class in said State are hereby required to report to the local boards of health of such cities, in writing, the name, age, sex, occupation, and residence of every person having tuberculosis who has been attended by, or who has come under the observation of such physician for the first time, within five days of such time.

Sec. 5551. All local boards of health of cities of the first and second class in this State are hereby required to receive and keep a permanent record of the reports required by section five thousand five hundred and fifty to be made to them; such records shall not be open to public inspection, but shall be submitted to the proper inspection of other local and State boards of health alone, and such records shall not be published nor made public.

* * * * * * *

Sec. 5553. Any practicing physician who shall wilfully fail to comply with the provisions of section five thousand five hundred and fifty shall be guilty of a misdemeanor, and on conviction thereof may be fined for the first offense not exceeding five dollars and for any subsequent offense not exceeding one hundred dollars.

WEST VIRGINIA.

[Supplement to Code, 1909.]

Sec. 4383. * * * The said local board of health shall make and establish for their county, or for any district, or place therein, such sanitary regulations or rules as they may deem proper to prevent the outbreak and spread of cholera, smallpox, scarlet fever, diphtheria, tuberculosis, and other endemic, epidemic, infectious, and contagious diseases, * * *. It shall be the duty of every practicing physician in any county in which there is such local board of health to report promptly all or any diseases of the above-named character under treatment by him, and said local board shall once at least in every three months report to the State board of health the character of all such infectious, contagious, and epidemic diseases, the number of persons reported as infected with such diseases, naming the same, the action taken by the local board to arrest the progress of every such disease and the visible effects, if any, of such action.

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WISCONSIN.

[Annotated Statutes, 1898.]

Sec. 925—111b. It shall be the duty of every physician practicing in any city which has adopted this chapter (cities under general law) to report in writing to the commissioner of public health every patient he shall have who is sick with smallpox, scarlet fever, diphtheria, typhoid fever, Asiatic cholera, or any other dangerous contagious disease, within twenty-four hours after he shall ascertain or suspect the nature of such disease. The reports shall be in such form as may be prescribed by the State board of health, and shall state the name, sex, age, and place of residence of the person whose sickness is reported, the nature of the disease and such additional facts as said board may prescribe. Any practicing physician who shall refuse or neglect to perform the duties required of him by this section, or who shall make a false return of the facts required, shall be punished by a fine not less than twenty-five dollars nor more than one hundred dollars for each offense, or by imprisonment in the county jail for a period not exceeding sixty days, or by both fine and imprisonment.

* * * * * * *

Sec. 1409a–2. (Added by acts of 1909, ch. 59.) * * * Should one or both eyes of an infant become inflamed, swollen, and red, and show an unnatural discharge at any time within two weeks after its birth, nurse, parents, or other attendant having charge of such infant shall report in writing, within six hours thereafter, to the board of health of the city, incorporated village, or town in which the parents of the infant reside the fact that such inflammation, swelling, redness,'or unnatural discharge exists.

* * * * * * *

Sec. 1412. It shall be the duty of every health officer, chosen under the provisions of the preceding section, or under any village or city charter, upon the appearance of any dangerous contagious disease in the territory within the jurisdiction of the board of which he is a member, to immediately investigate all the circumstances attendant upon the appearance of such disease, make a full report to such board, and also to the State board of health. * * *

Sec. 1412a (as amended by Acts of 1909, ch. 85). Whenever any physician practicing in this State shall know or have good reason to believe that any person whom he treats or visits is sick with a dangerous, contagious, or infectious disease, he shall, immediately after obtaining such knowledge or forming such belief, give notice thereof in writing, stating the name, sex, age, and place of residence of person whose sickness is reported, the nature of the disease and such additional facts as said board may prescribe to the board of health of the town, city, or village in which such sick person shall then be, and if he shall fail to so do for a period of twenty-four hours thereafter, he shall forfeit not less than five nor more than twenty-five dollars for each day of such failure after the expiration of said twenty-four hours, provided such notice may be sent by mail, or, except in cities, may be given to, or left at the residence of, any member of the board of health. When any person is sick with any such disease, and no physician is in attendance upon such person, the provisions of this section shall apply to the responsible head of the family of which he is a member, or if the sick person is not a member of the family occupying the house or building in which he may be, the person in charge thereof. * * * .

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Sec. 1416—1 (Acts of 1905, ch. 192, as amended by Acts of 1907, ch. 93). It shall be the duty of every physician to report to the department of health in every town, incorporated village, or city, in writing, the full name, age, and address of every person suffering from any one of the infectious or contagious diseases following, to wit: Measles, smallpox, diphtheria (membranous croup), scarlet fever (scarlatina), typhoid fever, tuberculosis (of any organ), rubella (rotheln), chicken pox, typhus fever, plague, erysipelas, Asiatic cholera, whooping cough, cerebro-spinal meningitis, yellow fever; and it shall be the duty of every person, owner, agent, manager, principal, or superintendent of any public or private institution or dispensary, hotel, boarding or lodging house, in any such town, incorporated village, or city to make a report in like manner and form of any inmate, occupant, or boarder suffering from any of the said infectious or contagious diseases.

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Sec. 1416—3 (amended by Acts of 1907, ch. 93). It shall be the duty of every person having knowledge of the existence of any person afflicted with any one of the following infectious or contagious diseases, to wit: Measles, diphtheria (membranous croup), scarlet fever, typhoid fever, tuberculosis, smallpox, Asiatic cholera, typhus fever, rubella (rotheln), plague, and whooping cough, or has reason to believe that any person is so afflicted, to at once report to the health department of such town, incorporated village, or city all facts in regard to the case. * * *

Sec. 1416—4 (amended by Acts of 1907, ch. 93). It shall be the duty of every physician, or person, or owner, agent, manager, principal, or superintendent of each and every public or private institution or dispensary, hotel, boarding or lodging house, in any such city to report to the department of health thereof, in writing, or to cause such report to be made by some proper and competent person, the name, age, sex, occupation, and latest address of every person afflicted with tuberculosis, who is in their care, or who has come under their observation, within one week of such time.

WYOMING.

[Compiled statutes, 1910.]

Sec. 2934. * * * It shall be their [State board of health] duty to investigate regarding all contagious and infectious diseases that are a menace to public safety, and they shall collect such information in respect to these matters as may be useful in the discharge of their duties and contribute to the promotion of health and security of life in this State. .

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Sec. 2936. * * * When in any county a case of smallpox, cholera, typhoid fever, scarlet fever, diphtheria, or other epidemic or contagious or infectious disease is known to exist, it shall be the duty of the county health officer of such county to immediately notify the secretary of the State board of health of the existence of the same, with such facts as to its cause and continuance as may then be known.

*   *   *   *   *   *   *

SEC. 2942. It shall be the duty of every practicing or licensed physician in the State of Wyoming to report immediately to the secretary of the State board of health and county health officer, by telegram or telephone, or in the most expeditious manner, every case of smallpox, cholera, scarlet fever, diphtheria, or contagious or infectious disease that is a menace to public health, and such telegram shall be paid for out of the funds provided for the expenses of said State board of health.

SEC. 2943. Any practicing or licensed physician who shall fail to report to said secretary any such case in the manner provided in the preceding section, or shall willfully make any false report regarding any such case, shall be guilty of a misdemeanor, and upon conviction thereof shall be fined in the sum of not less than one hundred dollars and not more than one thousand dollars, or imprisoned in the county jail not less than six months nor more than one year.

NEW YORK.

[Laws of 1911, ch. 258.][a]

SEC. 1. Article four of the labor law, entitled "An act relating to labor, constituting chapter thirty-one of the consolidated laws," is amended by the addition of a new section numbered fifty-eight, to read as follows:

§ 58. *Industrial poisonings to be reported.*—1. Every medical practitioner attending on or called in to visit a patient whom he believes to be suffering from poisoning from lead, phosphorus, arsenic or mercury or their compounds, or from anthrax, or from compressed air illness, contracted as the result of the nature of the patient's employment, shall send to the commissioner of labor a notice stating the name and full postal address and place of employment of the patient and the disease from which, in the opinion of the medical practitioner, the patient is suffering, with such other and further information as may be required by the said commissioner.

2. If any medical practitioner, when required by this section to send a notice, fails forthwith to send the same, he shall be liable to a fine not exceeding ten dollars.

3. It shall be the duty of the commissioner of labor to enforce the provisions of this section, and he may call upon the State and local boards of health for assistance.

SEC. 2. This act shall take effect September first, nineteen hundred and eleven.

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[a] Copy of law received too late for insertion in proper order.

SOME COURT DECISIONS HAVING A BEARING ON THE NOTIFICATION OF DISEASE.[1]

IOWA.

* * * * * * *

2. The statute requires the collection of statistics pertaining to the population of the State and the health of the people which may impart information useful in the enactment of laws and valuable to science and the medical profession, to whom the people look for remedies for disease and for means tending to preserve health. The objects of the statutes are within the authority of the State, and may be attained in the exercise of its police power. Similar objects are contemplated by statutes requiring a census to be periodically taken, the constitutionality of which we have never heard questioned.

3. We need not inquire whether the requirements of the statute are unjust or oppressive. These are matters for the consideration of the legislative part of the Government. We may observe that it is difficult to discover oppression or injustice in requiring the medical profession to make known to the world statistics which may promote and are promoting the public health.

4. One ground of the demurrer is that defendant, under the statute, is required to do that which it is impossible for him to perform. The law requires of no man impossibilities. If the information sought from defendant could not have been obtained by him in the bona fide exercise of reasonable diligence, the law will not punish him for not imparting it. A physician should honestly endeavor to obtain and report all information required by the regulations of the statute and the board of health. This is his duty as a surgeon and is imposed as an obligation by the ethics of the useful and honorable profession of which he is a member. * * * (Robinson, Clerk, etc., *v.* Hamilton, 14 N. W. Rep., 202; 60 Iowa, 134.)

MICHIGAN.

* * * It is true that the evidence showed that a week or ten days after these children had been pronounced by the defendant as suffering from diphtheria, he stated to the health officer, Mr. John, as the health officer testifies, that "they had diphtheria at Lotharias' and Heft's," and that immediately after the board of health took steps to prevent its spread. Yet this was not the notice required by the statute, which is to be in writing, giving the name, place of residence, and nature of the disease. Upon this branch of the case the court directed the jury that it was a question for them to determine whether the defendant failed to report the cases within a reasonable time after he discovered the existence of the disease, and that in cases like diphtheria, where the disease is virulent and rapid in its action, eight days were not a reasonable time. There was no error in this charge, and we think the court would have been justified in saying that no notice was given at all, as required by the statute. * * * (People *v.* Brady, 51 N. W. Rep., 537; 90 Mich., 459.)

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[1] No attempt has been made to compile all court decisions on the subject, but those at hand have been inserted because of their possible interest.

CONNECTICUT.

The ordinance of the city of Bridgeport requiring every physician having any patient within the city limits sick with smallpox or varioloid, or other contagious or pestilential disease, to report the fact to the mayor or to the clerk of the board of health, together with the name of the patient and the street and number of the house where treated, under a penalty not exceeding $50 for each violation of the ordinance was held to be valid and not conflicting with the constitutional rights of the citizens, the legislature having power to authorize its enactment by the common council.

"The unequality of burden of which the defendant complains is only in seeming. Persons offering their services to the public as healers of disease and requiring pecuniary compensation therefor thereby assert their ability to detect the presence of it when the great mass of the people can not. The people accede to the truth of their assertion, and in the matter of life surrender themselves to their keeping. Of course an ordinance in the interest of life must detect the presence of a fatal contagious disease at the earliest possible moment. Therefore with impartial action it compels that member of the community who is the first to have sight and knowledge of it to give note of warning to others from whom its presence is hidden. It would be idle to require, indeed there would be danger in accepting, this service from those who can not see or do not know. The burden is made to rest upon every member of the only class which is in a condition to contribute anything to the accomplishment of the purpose of the ordinance." (State *v.* Wordin, 14 Atl. Rep., 801; 56 Conn., 216.)

LIST OF PUBLIC HEALTH BULLETINS.

The following is a list of the Public Health Bulletins that have been issued:

*1. Report on Trichinæ and Trichinosis. By W. C. W. Glazier. 1881. 212 pages. 87 il. 1 map. Paper. Senate Executive Document No. 9, Forty-sixth Congress, third session. Out of print.

*2. Report on the Etiology and Prevention of Yellow Fever. By George M. Sternberg. 1890. 271 pages. 21 pl. 20 il. Cloth. Out of print.

3. Mortality Statistics in the United States for the year ending December 31, 1897. From Annual Report Marine-Hospital Service, 1898. 24 pages. Paper.

4. Yellow Fever: Its Nature, Diagnosis, Treatment, and Prophylaxis and Quarantine Regulations Relating thereto. By officers of the Marine-Hospital Service. Reprint from Annual Report Marine-Hospital Service, 1898. 176 pages. 1 il. Paper.

*5. Shipment of Merchandise from a Town Infected with Yellow Fever. By H. R. Carter. 1899. 15 pages. Paper. Out of print.

6. Report of Commission of Medical Officers Detailed by Authority of the President to Investigate the Cause of Yellow Fever. By Eugene Wasdin and H. D. Geddings. July, 1899. 98 pages. 26 charts. 2 il. Paper.

*7. The Bubonic Plague. By Walter Wyman. January, 1900. 50 pages. Paper. Superintendent of Documents, 5 cents.

*8. Report of Commission Appointed by the Secretary of the Treasury for the Investigation of Plague in San Francisco. By Prof. Simon Flexner, Prof. F. G. Novy, and Prof. L. F. Barker. January 23, 1901. 23 pages. 1 map. Paper. Out of print.

9*. Report Relating to the Origin and Prevalence of Leprosy in the United States. By a Commission of Medical Officers of the U. S. Marine-Hospital Service. 1902. 119 pages. 25 il. Paper. Senate Document No. 269, Fifty-seventh Congress, first session. Superintendent of Documents. Cloth, $1.00.

*10. Plague Conference. Containing a copy of the address of the chairman, and resolutions passed by a conference called in accordance with requests from a number of State Boards of Health, and under authority of section 7, act of Congress approved July 1, 1902, to consider the plague situation. Reprint from P. H. R. No. 4, Vol. XVIII, January 23, 1903. 9 pages. And February 6, 1903. 41 pages. Paper. Out of print.

11. Transactions of the First Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1903. 120 pages. Cloth.

12. Transactions of the Second Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1904. 95 pages. Cloth.

13. The Public Health and Marine-Hospital Service of the United States. A Brief History. Prepared for the Louisiana Purchase Exposition. December, 1904. 16 pages. Paper.

*14. Sanatorium for Consumptives, Fort Stanton, N. Mex. By P. M. Carrington. Reprint from Annual Report Public Health and Marine-Hospital Service, 1904. 19 pages. Paper. Out of print.

---

* Exhausted and not for distribution.

15. Transactions of the Third Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1905. 52 pages. Cloth.
16. How to Prevent Yellow Fever—No Mosquitoes, No Yellow Fever. By Walter Wyman. July 31, 1905. 3 pages. Circular.
17. Transactions of the Fourth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1906. 75 pages. Cloth.
18. Transactions of the Fifth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. May, 1907. 47 pages. Cloth.
19. Trachoma, Its Character and Effects. By Taliaferro Clark and J. W. Schereschewsky. 1907. 34 pages. 6 il. Paper.
*20. The Public Health and Marine-Hospital Service of the United States. A Brief History. Prepared for the Jamestown Ter-Centennial Exposition. 1907. 12 pages. Paper. Out of print.
21. Transactions of the Sixth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. April, 1908. 79 pages. Cloth.
*22. The Present Pandemic of Plague. By J. M. Eager. 1908. 30 pages. Paper. Out of print.
23. Pellagra—A Precis. By C. H. Lavinder. July 24, 1908. 22 pages. 1 il. Paper.
24. The Marine-Hospital Sanatorium, Fort Stanton, N. Mex. Prepared for the International Congress on Tuberculosis, held in Washington, September, 1908. 32 il. 56 pages. Paper.
*25. Hookworm Disease. Reprint from Annual Report P. H. and M. H. S., 1908. 5 pages. Paper. Out of print.
26. Studies upon Leprosy.
    I. The Present Status of the Leprosy Problem in Hawaii.
    II. The Reaction of Lepers to Moro's "Percutaneous" Test.
    III. A Note Upon the Possibility of the Mosquito Acting in the Transmission of Leprosy. By W. R. Brinckerhoff. 1908. Investigations made in accordance with the act of Congress approved March 3, 1905. 24 pages. Paper.
27. Studies upon Leprosy.
    IV. Upon the Utility of the Examination of the Nose and the Nasal Secretions for the Detection of Incipient Cases of Leprosy. By W. R. Brinckerhoff and W. L. Moore. 1909. Investigations made in accordance with the act of Congress approved March 3, 1905. 29 pages. Paper.
28. Studies upon Leprosy.
    V. A Report upon the Treatment of Six Cases of Leprosy with Nastine (Deycke). By W. R. Brinckerhoff and J. T. Wayson, Honolulu, T. H.
    VI. Leprosy in the United States of America in 1909. By W. R. Brinckerhoff. 1909. Investigations made in accordance with the Act of Congress approved March 3, 1905. 25 pages. Paper.
29. The Prevalence of Rabies in the United States. By J. W. Kerr and A. M. Stimson. 1909. 16 pages. Paper.
30. The Rat and its Relation to the Public Health. By various authors. 1910. 254 pages. 60 figs. 6pls. Paper.
    1. Introduction. By Walter Wyman.
    2. Natural History of the Rat. By D. E. Lantz.
    3. Plague Infection in Rats. By G. W. McCoy.

---

* Exhausted and not for distribution.

30. The Rat and its Relation to the Public Health—Continued.
    4. Rat Leprosy. By W. R. Brinckerhoff.
    5. Bacterial Diseases of the Rat other than Plague. By D. H. Currie.
    6. Organic Diseases of the Rat. By G. W. McCoy.
    7. Ecto Parasites of the Rat. By N. Banks.
    8. Intestinal Parasites of Rats and Mice in their Relation to Diseases of Man. By C. W. Stiles.
    9. Rodents in Relation to the Transmission of Bubonic Plague. By Rupert Blue.
    10. Rodent Extermination. Rats and Mice. By W. C. Rucker.
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    12. Rat-Proofing as an Antiplague Measure. By R. H. Creel.
    13. Inefficiency of Bacterial Viruses in the Extermination of Rats. By M. J. Rosenau.
    14. Plague Eradication in Cities by Section Extermination of Rats and General Rat-Proofing. By Victor G. Heiser.
    15. The Rat in Relation to Shipping. By W. C. Hobdy.
    16. The Rat as an Economic Factor. By D. E. Lantz.
    17. The Rat in Relation to International Sanitation. By J. W. Kerr.
31. Transactions of the Seventh Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. June, 1909. 86 pages. Cloth.
32. Hookworm Disease (or Ground-Itch Anemia), its Nature, Treatment, and Prevention. By Prof. C. W. Stiles. 1910. 40 pages. Paper.
33. Studies upon Leprosy. 1910. 25 pages. Paper.
    VII. A Statistical Study of an Endemic Focus of Leprosy. By W. R. Brinckerhoff and A. C. Reinecke.
    VIII. A Palliative Treatment for Leprous Rhinitis. By J. T. Wayson and A. C. Reinecke.
34. Maritime Quarantine. By L. E. Cofer. 1910. 25 figs. 64 pages. Paper. Appendix: Disinfectants Authorized by United States Quarantine Regulations and the Proper Method of Generating and Using Same.
35. The Relation of Climate to the Treatment of Pulmonary Tuberculosis. By F. C. Smith. 1910. 17 pages. Paper.
36. Tuberculosis: Its Nature and Prevention. By F. C. Smith. 1910. 12 pages. 1 plate. Paper.
37. The Sanitary Privy: Its Purpose and Construction. By Prof. C. W. Stiles. 1910. 24 pages. 12 figs. Paper.
38. General Observations on the Bionomics of the Rodent and Human Fleas. By M. B. Mitzmain. 1910. 34 pages. Paper.
39. Studies upon Leprosy. September, 1910. 50 pages. Paper.
    IX. Mosquitoes in Relation to the Transmission of Leprosy.
    X. Flies in Relation to the Transmission of Leprosy. By D. H. Currie.
    XI. Heredity Versus Environment in Leprosy. By H. T. Hollmann.
40. Transactions of the Eighth Annual Conference of State and Territorial Health Officers with the United States Public Health and Marine-Hospital Service. November, 1910. 101 pages. Paper.
41. Studies upon Leprosy. November, 1910. 32 pages. Paper.
    XII. Notes on the Study of Histories of Lepers from the Standpoint of Transmission. By D. H. Currie.
    XIII. A Contribution to the Study of Rat Leprosy. By D. H. Currie and H. T. Hollmann.

42. Disinfectants. Their Use and Application in the Prevention of Communicable Diseases. By T. B. McClintic. December, 1910.
43. I. Studies upon Plague in Ground Squirrels. II. A Plague-like Disease of Rodents. By George W. McCoy. February, 1911. 71 pages. 7 pls. Paper.
44. Acute Anterior Poliomyelitis (Infantile Paralysis). By Wade H. Frost. February, 1911. 52 pages. Paper.
45. A Digest of the Laws and Regulations of the Various States Relating to the Reporting of Cases of Sickness. By John W. Trask.

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